

EXERCISE CARIBE WAVE 17

Costa Rica, Cuba and Northeastern Antilles
Scenarios

Participant Handbook

A Caribbean and Adjacent Region
Tsunami Warning Exercise
March 21, 2017

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



IOC Technical Series, _ (volume _)
Paris, December 201_
English only

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariats of UNESCO and IOC concerning the legal status of any country or territory, or its authorities, or concerning the delimitation of the frontiers of any country or territory.

NOTE: The United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Intergovernmental Oceanographic Commission (IOC) pattern the contents of this handbook after the CARIBE WAVE 2011, 2013, 2014, 2015 and 2016 Exercises. *Exercise Caribe Wave 11: A Caribbean Tsunami Warning Exercise*, 23 March 2011, [IOC Technical Series, 93 Vol. 1](#), Paris, UNESCO 2010 (English, French and Spanish). *Exercise Caribe Wave/Lantex 13: A Caribbean Tsunami Warning Exercise*, 20 March 2013, [IOC Technical Series, 101, vol. 1](#), Paris, UNESCO 2012. *Exercise Caribe Wave/Lantex 14: A Caribbean and Northwestern Atlantic Tsunami Warning Exercise*, 26 March 2014, [IOC Technical Series, 109, vol. 1](#), Paris, UNESCO 2013 (English and Spanish). *Exercise Caribe Wave/Lantex 15: A Caribbean and Northwestern Atlantic Tsunami Warning Exercise*, 25 March 2015, [IOC Technical Series, 118, vol. 1](#), Paris, UNESCO 2014. *Exercise Caribe Wave 16: A Caribbean and Adjacent Regions Tsunami Warning Exercise*, 17 March 2016, [IOC Technical Series, 125, vol. 1](#), Paris, UNESCO 2015. These CARIBE WAVE handbooks followed the Pacific Wave 08 manual published by the Intergovernmental Oceanographic Commission (*Exercise Pacific Wave 08: A Pacific-wide Tsunami Warning and Communication Exercise*, 28-30 October 2008, [IOC Technical Series, 82](#), Paris, UNESCO 2008). The UNESCO *How to Plan, Conduct and Evaluate Tsunami Wave Exercises*, [IOC Manuals and Guides, 58 rev.](#), Paris, UNESCO 2013 (English and Spanish) is another important reference.

For bibliographic purposes, this document should be cited as follows:

Intergovernmental Oceanographic Commission. 2016. *Exercise Caribe Wave 17. Tsunami Warning Exercise, 21 March 2017* (Costa Rica, Cuba and Northeastern Antilles Scenarios). *Volume 1: Participant Handbook*. IOC Technical Series No. _ vol._. Paris: UNESCO. (English)

Report prepared by: Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS)

Published in 201_
by United Nations Educational, Scientific
and Cultural Organization
7, Place de Fontenoy, 75352 Paris 07 SP

□ UNESCO 201_

(IOC/201_/TS/1_ Vol._ Rev.)

Contents

| | |
|--|-----|
| Summary..... | 1 |
| 1. BACKGROUND..... | 1 |
| 1.1 EXERCISE JUSTIFICATION AND FRAMEWORK..... | 1 |
| 1.2 EXERCISE EARTHQUAKE AND TSUNAMI SCENARIO..... | 3 |
| 1.2.1 Costa Rica Scenario..... | 3 |
| 1.2.2 Cuba Scenario..... | 4 |
| 1.2.3 Northeastern Antilles Scenario..... | 4 |
| 1.2.4 Earthquake impact..... | 5 |
| 2. EXERCISE CONCEPT..... | 6 |
| 2.1 PURPOSE..... | 6 |
| 2.2 OBJECTIVES..... | 6 |
| 2.3 TYPE OF EXERCISE..... | 7 |
| 2.4 TIMELINE..... | 9 |
| 3. PTWC PRODUCTS..... | 9 |
| 4. EXERCISE OUTLINE..... | 10 |
| 4.1 GENERAL..... | 10 |
| 4.2 MASTER SCHEDULE (EXERCISE SCRIPT)..... | 12 |
| 4.2.1 Costa Rica Earthquake Scenario..... | 12 |
| 4.2.2 Cuba Earthquake Scenario..... | 13 |
| 4.2.3 Northeastern Antilles Earthquake Scenario..... | 14 |
| 4.3 ACTIONS IN CASE OF A REAL EVENT..... | 14 |
| 4.4 PROCEDURE FOR FALSE ALARM..... | 14 |
| 4.5 RESOURCES..... | 15 |
| 4.6 COMMUNITY REGISTRATION..... | 15 |
| 4.7 MEDIA ARRANGEMENTS..... | 15 |
| 5. POST-EXERCISE EVALUATION..... | 17 |
| 6. REFERENCES..... | 17 |
| Annex A. Standard Operating Procedures..... | 19 |
| Annex B. Example Table Top Exercise..... | 22 |
| Annex C. Tsunami Source Scenario Description..... | 25 |
| Annex D. Earthquake Impact Scenario..... | 33 |
| Annex E. TWC Dummy (Start of Exercise) Messages..... | 40 |
| Annex F. TWC Exercise Messages..... | 41 |
| Annex G. Sample Press Release for Local Media..... | 174 |

Summary

The Intergovernmental Coordination Group for Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS) of the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) Intergovernmental Oceanographic Commission (IOC), the U.S. National Oceanic and Atmospheric Administration (NOAA), and the Caribbean Regional Emergency Management Stakeholders (CEPREDENAC, CDEMA, and EMIZ) will be conducting the CARIBE WAVE tsunami exercise on March 21, 2017. The purpose of this exercise is to advance tsunami preparedness efforts in the Caribbean Region.

Three exercise scenarios are planned. The first scenario simulates a tsunami generated by a magnitude 7.9 earthquake located off the Caribbean coast of Costa Rica, in the southern Caribbean Sea. The second scenario is a tsunami generated by a magnitude 8.2 earthquake located off the southeastern coast of Cuba, in the northwestern portion of the Caribbean Sea. The third scenario is a tsunami generated by a magnitude 8.5 earthquake located East of the Northeastern Antilles. The initial dummy message for the three scenarios will be issued by the CARIBE EWS Tsunami Service Provider [Pacific Tsunami Warning Center (PTWC)] on March 21, 2017 at 1400 UTC and disseminated over all its standard broadcast channels. The dummy message is issued to test communications between the PTWC with Tsunami Warning Focal Points (TWFPs) and National Tsunami Warning Centers (NTWCs), and to start the exercise. As of 1405 UTC the PTWC will only send by emails the simulated tsunami products to officially designated TWFPs and NTWCs. Each country and territory will choose one scenario and decide if and how to disseminate messages within its area of responsibility.

The manual includes information on the tsunami and earthquake scenarios, timelines, and the PTWC dummy message and simulated exercise threat messages. High levels of vulnerability and risk to life and livelihoods from tsunamis along the Caribbean coast should provide a strong incentive for countries and local jurisdictions to prepare for a tsunami and participate in this exercise.

1. BACKGROUND

1.1 EXERCISE JUSTIFICATION AND FRAMEWORK

This tsunami exercise is being conducted to assist tsunami preparedness efforts throughout the Caribbean region. Recent tsunamis, such as those in the Indian Ocean (2004), Samoa (2009), Haiti (2010), Chile (2010, 2014, 2015), and Japan (2011), attest to the importance of proper planning for tsunami response.

Historical tsunami records from sources such as the NOAA National Centers for Environmental Information (NCEI) show that over 75 tsunamis 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. According to NCEI, in the past 500 years 4,561 people have lost their lives to tsunamis in the Caribbean and Adjacent Regions. Since the most recent devastating tsunami of 1946, there has been an explosive population growth and influx of tourists along the Caribbean and Western Atlantic coasts increasing the tsunami vulnerability of the region

(von Hillebrandt-Andrade, 2013). In addition to 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. 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 thrust and strike slip faulting characterize northern South America, eastern Central America, the Cayman Ridge and Trench and the northern plate boundary (Benz et al, 2011). In addition to the local and regional sources, the region is also threatened by tele-tsunamis/trans-Atlantic tsunamis, like that of 1755 from Lisbon. With nearly 160 million people (Caribbean, Central America and Northern South America) now living in this region and a major earthquake occurring about every 50 years, the question is not if another major tsunami will happen, but when it happens will the region be prepared for the impact. The risk of earthquakes generating tsunamis in the Caribbean is real and should be taken seriously.

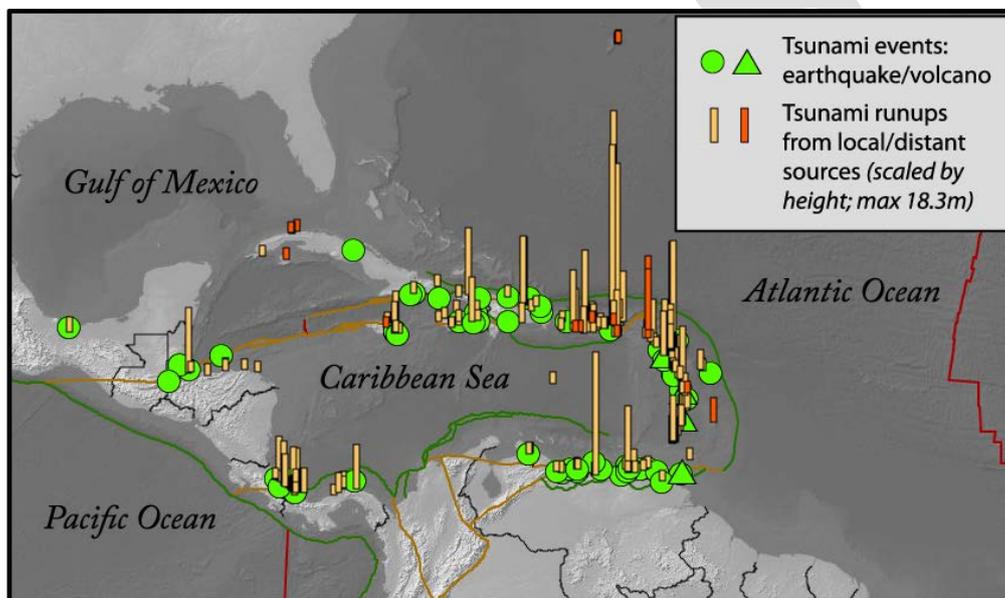


Figure 1. Map of tsunami run-ups in the Caribbean 1493-2013 (National Centers for Environmental Information, <http://www.ngdc.noaa.gov/hazards/tsu.shtml>). Artist: Jessee Varner; originally published in von Hillebrandt-Andrade, 2013.

Tsunami services for the Caribbean and Adjacent Regions within the UNESCO IOC CARIBE EWS framework are currently provided by the PTWC in Honolulu. On March 1st, 2016 enhanced tsunami products for CARIBE EWS were implemented. The PTWC issues these tsunami products approximately two to ten minutes after the occurrence of an earthquake. As of 2016 the PTWC international products include public tsunami information and threat messages (no longer watch messages). Primary recipients of the PTWC messages include TWFPs and NTWCs. These agencies, which also receive graphical and other products, are responsible to issue the corresponding warning messages within their area of responsibility according to established protocols.

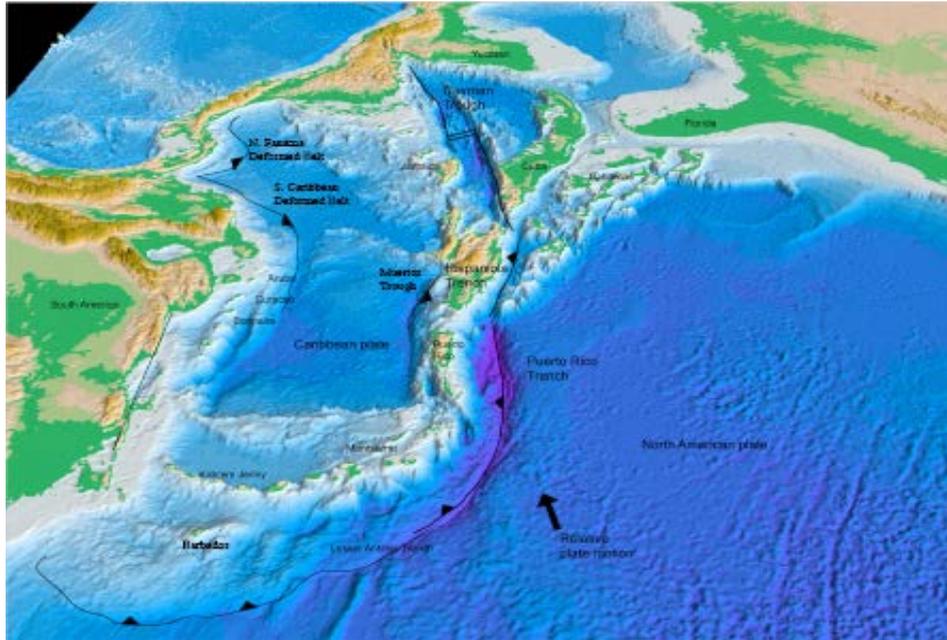


Figure 2. Tectonic features in the Caribbean (ten Brink et al., 2008).

1.2 EXERCISE EARTHQUAKE AND TSUNAMI SCENARIO

This exercise will provide simulated tsunami threat messages from the PTWC based on a hypothetical magnitude Mw 7.9 earthquake located off the Caribbean coast of Costa Rica, a Mw 8.2 earthquake located along the southeastern coast of Cuba and a Mw 8.5 earthquake along the Northern Lesser Antilles (Figure 3).

1.2.1 Costa Rica Scenario

Costa Rica is bounded on the west by the subduction of the Cocos plate under the Caribbean plate, and partially on the east by the North Panama Deformed Belt (NPDB). The NPDB is characterized by crustal folding and thrust faulting in addition to continuation of thrust faulting on land (Lundgren, et. al., 1993). While the recorded seismicity along the Costa Rica Caribbean coastal margin has been relatively low compared to its counter Pacific side, the westernmost extent of the North Panama Deformed Belt (NPDB) produced a Mw. 7.7 earthquake on April 22, 1991 that resulted in tsunami runup up to 2 m (Plafker and Ward, 1992) and maximum inundation of 300 m near Cahuita-Puerto Viejo, Costa Rica. According to a comparison of GPS measurements from before and after the earthquake, co-seismic horizontal displacements at Limon, Bratsi, Vueltas and ETCG (in San Jose) measured 244.7 ± 0.8 , 89.2 ± 0.9 , 12.4 ± 1.3 , and 1.9 ± 0.9 cm while vertical displacements measured 16.3 ± 2.1 , 15.3 ± 3.0 , -10.5 ± 4.4 , and -0.6 ± 2.1 cm respectively (Lundgren et al., 1993). Other authors reported coseismic uplift up to 157 cm (Plafker and Ward, 1992) and 185 cm (Denyer et al., 1994). For this exercise a M 7.9 earthquake located at $9.4^{\circ}\text{N } 82.5^{\circ}\text{W}$ ruptures a 150 km long by 45 km wide fault segment at 19 km depth. The scenario produces localized wave amplitudes between one and more than three meters, and regional amplitudes less than one meter. Shaking intensities reach up to VIII on the Modified Mercalli Intensity Scale, according to Shakemap (Appendix D).

1.2.2 Cuba Scenario

The southern margin of Cuba marks a segment of the northern boundary of the Caribbean Plate. It is represented by the Oriente fault, a left-lateral east strike-slip fault characterized by a transpressional mechanism and dextral offset segments. South of this margin, several morphologic features are identified: the Oriente Wall, the Cabo Cruz basin, the East Deep, the Santiago Promontory, the Imias Basin, the Chivirico and the Baitiquiri basins, and the Windward Passage. It is within the Oriente deep depression that the Santiago Deformed Belt undergoes compression and dips towards the north (Calais and Lepinay, 1991). According to www.ngdc.noaa.gov/, in 1775 an earthquake in the vicinity of Santiago de Cuba produced a tsunami that affected parts of Haiti and the south of Cuba. Also, in 1832, a possible earthquake at sea produced waves that affected the bay at Santiago de Cuba. For this exercise a rupture in the Santiago Deformed Belt located at 19.6°N 76.4°W produces an earthquake of Mw. 8.24 with a 270 km long by 40 km wide fault plane 20 km deep. The scenario produces local and regional wave amplitudes reaching more than three meters.

1.2.3 Northeastern Antilles Scenario

Along the Northeastern Antilles arc, the Atlantic plate subducts below the Caribbean at a rate of 2 cm per year. The subduction turns nearly perpendicular to the trench at latitudes 12°N and 19°N. Here, in 1843 a major earthquake with estimated magnitudes between M 7.0-M 8.7 and a rupture length between 100-300 km affected the Lesser Antilles region (Hayes et al., 2013). This event produced a tsunami with maximum water height of 1.2 m at Antigua (<https://www.ngdc.noaa.gov/>). For this exercise a 10 m slip results in a M 8.5 event located at 17°N and 67°W that ruptures a segment 200 km long and 65 km wide, located at 40 km depth. Based on Bilek and Lay (1999), and the depth of 35 km, a shear modulus of 50 GPa was used. The scenario produces waves of maximum amplitudes larger than three meters, mostly locally, and waves up to three meters at a regional scale.

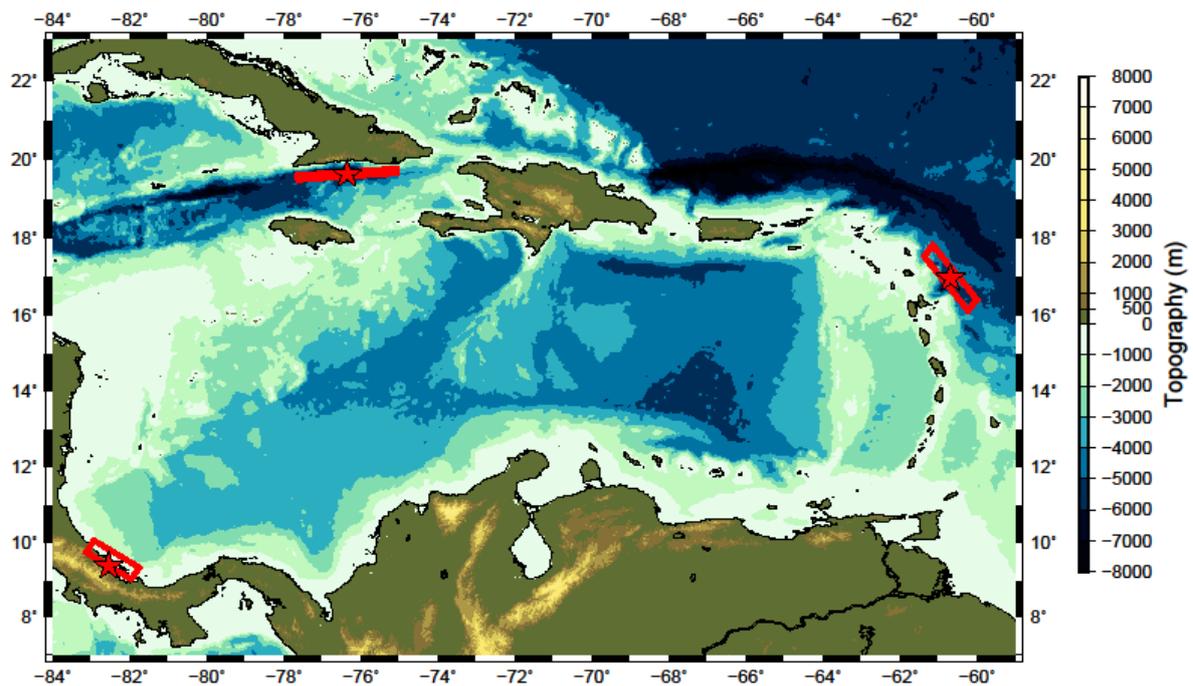


Figure 3. CARIBE WAVE 17 scenario map indicating epicenters and fault segments, underlain using etopo1 model (Amante and Eakins, 2009). The Generic Mapping Tool (GMT) generated the figure (Wessel et al., 2013).

1.2.4 Earthquake impact

When planning for tsunamis, in addition to knowing the potential impact from the waves, it is also important to consider the potential earthquake impact. This is especially important for the near field. In consideration of this, the United States Geological Survey (USGS) provided for the CARIBE WAVE 17 scenarios the simulated outputs of their ShakeMap and the Prompt Assessment of Global Earthquakes for Response (PAGER) products. These results provide emergency responders, government, aid agencies and the media the scope of the potential earthquake related disaster. ShakeMap illustrates the ground shaking levels close to the earthquake source depending on a set of parameters such as distance to the source, rock and soil behavior and seismic wave propagation through the crust (<http://earthquake.usgs.gov/research/shakemap/>). PAGER is based on the earthquake shaking (via ShakeMap) and analyses of the population exposed to each level of shaking intensity with models of economic and fatality losses based on past earthquakes in each country or region of the world (<http://earthquake.usgs.gov/research/pager/>). For the CARIBE WAVE 17 scenarios, the USGS estimated that significant casualties and damage are likely from the earthquakes themselves, which would require regional or national level response. According to the PAGER results, the countries that are going to receive the greatest impact from the earthquakes are Costa Rica, Cuba, Antigua and Barbuda and Guadalupe. The complete ShakeMap and PAGER output for the exercise scenarios is available in the [Annex D](#) of this handbook.

Exercises help improve the readiness of countries of the Caribbean and Adjacent to respond in the event of a dangerous tsunami. Similar recent exercises in the Caribbean and Adjacent Regions (CARIBE WAVE and LANTEX) as well as the Pacific and Northeast Atlantic and Mediterranean Basins have proven effective in strengthening preparedness levels of emergency management organizations and the populations at risk.

2. EXERCISE CONCEPT

2.1 PURPOSE

The purpose of the exercise is to improve Tsunami Warning System effectiveness along the coasts of the Caribbean and Adjacent Regions. The exercise provides an opportunity for the corresponding emergency management organizations 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 the Caribbean and Adjacent regions, where tsunamis are infrequent but can be of very high impact. All emergency management organization (EMO) are encouraged to participate and include the communities at risk.

2.2 OBJECTIVES

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

- 1. To exercise and evaluate operations of the CARIBE EWS Tsunami Warning System.**
 - A. Validate the **issuance** of tsunami products from the PTWC.
 - B. Validate the **receipt** of tsunami products by CARIBE EWS Tsunami Warning Focal Points (TWFPs) and/or National Tsunami Warning Centers NTWCs).
- 2. To evaluate the use of PTWC CARIBE EWS products.**
- 3. To validate the readiness to respond to a tsunami.**
 - A. Validate the operational readiness of the TWFPs/ NTWCs and/or the National Disaster Management Office (NDMO).
 - B. To improve operational readiness. Before the exercise, ensure appropriate tools and response plan(s) have been developed, including public education materials.
 - C. Validate that the dissemination of warnings and information/advice by TWFPs, and NTWCs, to relevant in-country agencies and the public is accurate and timely.
 - D. Validate the organizational decision-making process (tsunami response plans) about public warnings and evacuations.
 - E. Validate that the methods used to notify and instruct the public are accurate and timely.
 - F. Evaluate the status of the implementation of the TsunamiReady recognition program.

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 alarming the general public. Offices of Emergency Management (OEM) are, however, encouraged to exercise down to the level of testing local notification systems such as the Emergency Alert System (EAS), sirens, or loudspeakers to engage communities at risk.

Exercises stimulate the development, training, testing, and evaluation of Disaster Plans and Standard Operating Procedures (SOP). Most countries in the region have participated in SOP workshops in 2013-2015, and should use the materials and expertise acquired to help guide exercise preparation and conduct. [Annex A](#) gives an overview of SOPs. Exercise participants may also use their own past multi-hazard drills (e.g. flood, hurricane, tsunami, earthquake, etc.) as a framework to conduct CARIBE WAVE 17.

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 [Annex B](#) 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 involve 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 weeks | Hours | Individual or mixed groups |
| Drill | 2 months | 1 day | Individual technical groups generally |
| Tabletop Exercise | 1 month | 1-3 days | Single or multiple agency |
| Functional Exercise | > 3 months | 1-5 days | Multiple Agency participation |
| Full-scale Exercise | >6 months | 1 day/ week | Multiple Agency participation |

2.4 TIMELINE

The following table highlights the timeline of actions to be taken, before, during and after CARIBE WAVE 17.

| ACTION | DUE DATE |
|--|--|
| Draft Circulated among ICG CARIBE EWS TNC/TWFP | Sep-16 |
| Deadline for Comments | Sep-16 |
| Final Exercise Handbook Available Online | Oct-16 |
| Circular Letter Issued by IOC to MS | Nov-16 |
| 1st Webinar CW | 17 - Jan- 2017 -English 18 - Jan- 2017 -Spanish 19 - Jan- 2017 -French |
| 2nd Webinar CW | 7- Mar- 2017 -English 8- Mar- 2017 -Spanish 9- Mar- 2017 -French |
| Member States and Territories inform which scenario they will be using for the exercise | 10-Mar-2017 |
| Exercise | 21-Mar-17 |
| Exercise Evaluation Due | 3-Apr-17 |
| Draft Final Caribe 17 Report | 19-Apr-17 |
| Discussion of Exercise ICG CARIBE EWS 12th Session | 2-4- May-17 (Tentative) |

3. PTWC PRODUCTS

On March 1st, 2016 the CARIBE EWS fully transitioned to the PTWC Enhanced Products. As of the second message these products are threat-based on tsunami wave forecasts, rather than on earthquake magnitude thresholds and travel time. Several levels of tsunami threat have been established, and forecast threat levels are assigned to polygons representing segments of extended coastlines or to island groups. These improvements should greatly reduce the number of areas warned unnecessarily and also provide some advance notice of potential local tsunamis. Details on the PTWC Enhanced Products for the CARIBE EWS are provided in the “User’s Guide for the Pacific Tsunami Warning Center Enhanced Products for the CARIBE EWS” (<http://www.caribewave.info>). For the CARIBE WAVE 17, threat messages and enhanced graphical products for the chosen scenario by each Member State and Territory will be disseminated by email to officially designated TWFPs and NTWCs. These products have also been included in [Annexes C](#) and [F](#). Therefore each country and territory have to decide if and how to disseminate messages within its areas of responsibility.

There are important differences between PTWC’s previous products and its enhanced products. Previous products used the term “watch” to indicate that there was a potential threat

to the countries within the watch. Specifically, a country was designated by PTWC as being in a Tsunami Watch depending upon the tsunami threat presented by the event (e.g. earthquake magnitude and location), as well as the time remaining until the potential tsunami impact. Over the last several years, however, the use of the term “Watch” caused concern that the PTWC-designated level of alert could conflict with a country’s independently derived level of alert. As each country is sovereign and thus responsible for the safety of its own population, the PTWC enhanced products no longer use the “watch” term but as of March 1st, 2016 instead provide forecasted wave heights along coasts.

4. EXERCISE OUTLINE

4.1 GENERAL

Tsunami messages for this exercise are issued by the PTWC based on three hypothetical earthquakes with the following hypocenter parameters:

Costa Rica Earthquake Scenario:

- Origin Time 14:00:00 UTC March 21, 2017
- Latitude 9.37°
- Longitude -82.54°
- Magnitude 7.9 – Mw
- Depth 19 km

Cuba Earthquake Scenario:

- Origin Time 14:00:00 UTC March 21, 2017
- Latitude 19.625°
- Longitude -76.35°
- Magnitude 8.2 – Mw
- Depth 20 km

Northeastern Antilles Earthquake Scenario:

- Origin Time 14:00:00 UTC March 21, 2017
- Latitude 16.96°
- Longitude -60.69°
- Magnitude 8.5 – Mw
- Depth 10 km

Expected impacts for these events are determined from pre-computed tsunami forecast models. The models indicate a significant tsunami along many coasts in the Caribbean Sea. [Annex C](#) provides model results.

Pacific Tsunami Warning Center:

While the first tsunami threat message issued by PTWC is based on the earthquake magnitude and location and the tsunami travel times. As of the second message they are based on tsunami wave forecasts, rather than based upon seismic information. Tsunami threat forecasts

EMOs can 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.

4.2 MASTER SCHEDULE (EXERCISE SCRIPT)

4.2.1 Costa Rica Scenario

The Costa Rica scenario consists of a tsunami generated by a magnitude 7.9 earthquake with epicenter at 9.37°, -82.54° occurring on March 21, 2017 at 1400 UTC. The initial alert is disseminated at 1405 UTC.

Table 2. Timeline Messages issued by PTWC

| Date | Time (UTC) | PTWC | |
|---------|------------|---|------------------------------------|
| | | Type of Product | Transmission Method |
| 3/21/17 | 1400 | ----- Earthquake Occurs ----- | |
| 3/21/17 | 1400 | Dummy | NWWS, GTS, EMWIN, AISR, Fax, Email |
| 3/21/17 | 1405 | Tsunami Threat Message #1 | Email |
| 3/21/17 | 1425 | Tsunami Threat Message # 2 and Graphic Enhanced Product | Email |
| 3/21/17 | 1525 | Tsunami Threat Message #3 | Email |
| 3/21/17 | 1625 | Tsunami Threat Message #4 | Email |
| 3/21/17 | 1725 | Tsunami Threat Message #5 | Email |
| 3/21/17 | 1825 | Tsunami Threat Message #6 | Email |
| 3/21/17 | 1925 | Final Tsunami Threat Message #7 | Email |

4.2.2 Cuba Scenario

The Cuba scenario consists of a tsunami generated by a magnitude 8.2 earthquake with epicenter at 19.625°, -76.35° occurring on March 21, 2017 at 1400 UTC. The initial alert is disseminated at 1405 UTC.

Table 3. Timeline Messages issued by PTWC

| Date | Time (UTC) | PTWC | |
|---------|------------|---|------------------------------------|
| | | Type of Product | Transmission Method |
| 3/21/17 | 1400 | ---- Earthquake Occurs ---- | |
| 3/21/17 | 1400 | Dummy | NWWS, GTS, EMWIN, AISR, Fax, Email |
| 3/21/17 | 1405 | Tsunami Threat Message #1 | Email |
| 3/21/17 | 1425 | Tsunami Threat Message # 2 and Graphic Enhanced Product | Email |
| 3/21/17 | 1525 | Tsunami Threat Message #3 | Email |
| 3/21/17 | 1625 | Tsunami Threat Message #4 | Email |
| 3/21/17 | 1725 | Tsunami Threat Message #5 | Email |
| 3/21/17 | 1825 | Tsunami Threat Message #6 | Email |
| 3/21/17 | 1925 | Tsunami Threat Message #7 | Email |
| 3/21/17 | 2025 | Tsunami Threat Message #8 | Email |
| 3/21/17 | 2125 | Final Tsunami Threat Message #9 | Email |

4.2.3 Northeastern Antilles Scenario

The Northeastern Antilles scenario corresponds to a tsunami generated by a magnitude 8.5 earthquake with epicenter at 16.96°, -60.69° occurring on March 21, 2017 at 1400 UTC. The initial alert is disseminated at 1405 UTC.

Table 4. Timeline Messages issued by PTWC

| Date | Time (UTC) | PTWC | |
|---------|------------|---|------------------------------------|
| | | Type of Product | Transmission Method |
| 3/21/17 | 1400 | ---- Earthquake Occurs ---- | |
| 3/21/17 | 1400 | Dummy | NWWS, GTS, EMWIN, AISR, Fax, Email |
| 3/21/17 | 1405 | Tsunami Threat Message #1 | Email |
| 3/21/17 | 1425 | Tsunami Threat Message # 2 and Graphic Enhanced Product | Email |
| 3/21/17 | 1525 | Tsunami Threat Message #3 | Email |
| 3/21/17 | 1625 | Tsunami Threat Message #4 | Email |
| 3/21/17 | 1725 | Tsunami Threat Message #5 | Email |
| 3/21/17 | 1825 | Tsunami Threat Message #6 | Email |
| 3/21/17 | 1925 | Tsunami Threat Message #7 | Email |
| 3/21/17 | 2025 | Tsunami Threat Message #8 | Email |
| 3/21/17 | 2125 | Final Tsunami Threat Message #9 | Email |

4.3 ACTIONS IN CASE OF A REAL EVENT

In the case of a real event occurring during the exercise, the PTWC will issue the corresponding messages for that event. Such messages will be given full priority and a decision will be made by the PTWC whether to issue the Caribe Wave 17 dummy messages and to send email messages to corresponding recipients. In the case of smaller earthquakes, PTWC will issue the corresponding Tsunami Information Statement and the exercise will not be disrupted. All documentation and correspondence relating to this exercise is to be clearly identified as “**CARIBE WAVE 17**” and “**Exercise.**”

4.4 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 misinterpretation by media or the public.

4.5 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 the members of the CARIBE WAVE 17 Task Team (Table 4).

4.6 COMMUNITY REGISTRATION

For CARIBE WAVE 17, the Caribe EWS has teamed up with TsunamiZone.org for online registration. Under the Caribbean Zone Region Tab participants will be able to sign up and choose among the following community categories: individuals, businesses, schools, faith-based organizations, community groups, government agencies, individuals. The link for registration is <http://tsunamizone.org/caribbean>. After registering, they will be sent a confirmation email. If desired, participants can also opt to be listed in the “Who is participating?” section of the TsunamiZone website, along with participants in tsunami preparedness activities worldwide. The EMOs will thus have real time access to the status of registration of participants within their areas of responsibility. EMOs are encouraged to promote this registration system. In CARIBE WAVE 2016 over 331,000 were registered.

4.7 MEDIA ARRANGEMENTS

One advantage in conducting exercises is that it provides a venue to promote tsunami awareness. Many residents along the CARIBE EWS coast may not realize that a regional tsunami warning system exists, nor that national authorities have protocols in place to issue tsunami alerts, let alone the proper response for individuals. Therefore communities may wish to invite their local media to the exercise and to promote the awareness of the local tsunami hazard and protocols. Within all countries the media can also provide support in building awareness leading up to the exercise and avoid false alarms. The media should be provided with available informational brochures prepared by the local, regional and international agencies. It is also a good opportunity to distribute or prepare Media Guides like that of the Puerto Rico Seismic Network (PRSN) (<http://www.prsn.uprm.edu/mediakit/>) and the Seismic Research (<http://www.uwiseismic.com>) as additional guidance. Annex G contains a sample press release, which can be adapted as necessary.

Social media has been recognized as a very important means for disseminating tsunami information and products. CARIBE EWS countries and territories are encouraged to share information on the exercise CARIBE WAVE 17 through this medium. Furthermore, it is recommended that the hashtag **#CaribeWave**, be used by the participants before and during the exercise.

Table 4. Members of the CARIBE WAVE 17 Task Team

| Person | Telephone # | Email |
|---|--------------------|--|
| Patrick Tyburn, CARIBE WAVE 17 Chair, CARIBE EWS Chair WG4 | 596-596-393813 | patrick.tyburn@martinique.pref.gouv.fr |
| Elizabeth Vanacore, PRSN, CARIBE WAVE past Chair | 1-787-833-8433 | elizabeth.vanacore@upr.edu |
| Christa von Hillebrandt-Andrade, CARIBE EWS Chair; NWS CTWP Manager | 1-787-249-8307 | christa.vonh@noaa.gov |
| Milton Puentes, CARIBE EWS Vice Chair | 57-1-2020490 | milpuentes@gmail.com |
| Gerard Metayer, CARIBE EWS Vice Chair | 509-489-37805 | gerard_metayer@yahoo.fr |
| Paul Martens, CARIBE EWS Vice Chair | 1-721-542-6669 | Paul.Martens@sintmaartengov.org |
| Jean Marie Saurel, CARIBE EWS WG1 Chair | 33-183-957437 | saurel@ipgp.fr |
| Silvia Chacón, Chair CARIBE EWS WG2 | 506-8309-6690 | silviachaconb@gmail.com |
| Natalia Zamora, Scientific Expert - Costa Rica Scenario | NA | nzsauma@gmail.com |
| Antonio Aguilar, CARIBE EWS WG3 Chair | 582-122575153 | antoniodesastres@gmail.com |
| Charles McCreery, PTWC Director | 1-808-689-8207 | charles.mccreery@noaa.gov |
| Gerard Fryer, PTWC Rep. | 1-808-689-8207 | gerard.fryer@noaa.gov |
| Ronald Jackson, Director CDEMA | 246-425-0386 | ronald.Jackson@cdema.org |
| Roy Barboza Sequeira, Executive Secretary, CEPREDENAC | 502-2390-0200 | rbarboza@sica.int |
| Bernardo Aliaga, Technical Secretary UNESCO | 33-1-45683980 | b.aliaga@unesco.org |
| Valerie Clouard, Scientific Expert – Northeastern Antilles Scenario | 596-596-784144 | clouard@ipgp.fr |
| Bladimir Moreno, Scientific Expert – Cuba Scenario | 582- 641112 | bladimir@cenais.cu |

5. POST-EXERCISE EVALUATION

Each CARIBE EWS member state and territory is requested to provide feedback on the exercise. This feedback will assist the ICG/CARIBE-EWS in the evaluation of Caribe Wave 17 and the development of subsequent exercises, and help response agencies document lessons learned. To facilitate feedback the online evaluation survey can be accessed at the following link: <https://www.surveymonkey.com/r/CaribeWave17>. The deadline for completing the evaluation is **April 3, 2017**.

6. REFERENCES

Amante, C. and Eakins, B. W., 2009, ETOPO1 1 Arc-Minute Global Relief Model: Procedures, Data Sources and Analysis: NOAA Technical Memorandum NESDIS NGDC-24, p. 19.

Benz, H.M., Tarr, A.C., Hayes, G.P., Villaseñor, A., Furlong, K.P., Dart, R.L., and Rhea, S., 2011, Seismicity of the Earth 1900–2010 Caribbean plate and vicinity: U.S. Geological Survey Open-File Report 2010–1083-A, scale 1:8,000,000.

Bilek, S. L. and Lay, T., 1999, Rigidity variations with depth along interplate megathrust faults in subduction zones, *Nature* 400, 443-446. doi:10.1038/22739

Calais, E., and de Lepinay, B. M., 1991, From transtension to transpression along the northern Caribbean plate boundary off Cuba: implications for the Recent motion of the Caribbean plate: *Tectonophysics*, v. 186, no. 3, p. 329-350.

Colon, S., Audemard, F., A., Beck, C., Avila, J., Padron, C., De Batist, M., Paolini, M., Leal, A.F., and Van Welden, A., 2015, The 1900 Mw 7.6 earthquake offshore northcentral Venezuela: Is La Tortuga or San Sebastian the source fault?: *Marine and Petroleum Geology*, v. 67, p. 498-511.

Earthquake and Tsunami Hazard in Northern Haiti: Historical Events and Potential Sources, Intergovernmental Oceanographic Commission Workshop Report No. 255, Meeting of Experts Port-au-Prince, Haiti, 10–11 July 2013.

Grilli, A. R., Grilli, S. T., David, E., & Coulet, C., 2015, Modeling of Tsunami Propagation in the Atlantic Ocean Basin for Tsunami Hazard Assessment along the North Shore of Hispaniola: *International Offshore and Polar Engineering (ISOPE)*, p. 733- 740.

Hayes, G. P., McNamara, D. E., Seidman, L., and Roger, J., 2013, Quantifying potential earthquake and tsunami hazard in the Lesser Antilles subduction zone of the Caribbean region: *Geophysical Journal International*, v. 196, no. 1, p. 510-521.

Intergovernmental Oceanographic Commission Exercise Caribe Wave 11, A Caribbean Tsunami Warning Exercise, 23 March 2011, IOC Technical Series, vol. 93 , Paris, UNESCO 2010 (English, French and Spanish).

Intergovernmental Oceanographic Commission Exercise Caribe Wave/Lantex 13, A Caribbean Tsunami Warning Exercise, 20 March 2013, Volume 1: Participant Handbook, IOC Technical Series No. 101, Paris, UNESCO 2012.

Intergovernmental Oceanographic commission Exercise Caribe Wave/Lantex 14, A Caribbean and Northwestern Atlantic Tsunami Warning Exercise, 26 March 2014. Volume 1: Participant Handbook, IOC Technical Series No. 109, Paris, UNESCO 2013 (English and Spanish).

Intergovernmental Oceanographic commission, Exercise Caribe Wave/Lantex 15, A Caribbean and Northwestern Atlantic Tsunami Warning Exercise, 25 March 2015. Volume 1: Participant Handbook, IOC Technical Series, No. 118, Paris, UNESCO 2014.

Lundgren, P. R., Kornreich Wolf, S., Protti, M., and Hurst, K. J., 1993, GPS measurements of crustal deformation associated with the 22 April 1991, Valle de la Estrella, Costa Rica Earthquake: *Geophysical Research Letters*, v. 20, no. 5, p. 407-410.

National Centers for Environmental Information, accessed September 22, 2015 http://www.ngdc.noaa.gov/hazard/tsu_db.shtml.

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

Plafker, G. and Ward, S.N., 1992. Backarc thrust faulting and tectonic uplift along the Caribbean Sea coast during the April 22, 1991 Costa Rica earthquake. *Tectonics*, 11(4), p. 709–718.

von Hillebrandt-Andrade, Christa, 2013, Minimizing Caribbean Tsunami Risk: *Science*, Vol. 341, p. 966-968.

Wessel, P., W. H. F. Smith, R. Scharroo, J. F. Luis, and F. Wobbe, 2013, Generic Mapping Tools: Improved version released, *EOS Trans. AGU*, 94, p. 409-410.

Annex A. Standard Operating Procedures

END-TO-END TSUNAMI WARNING for Tsunami Warning Focal Points and Tsunami Emergency Response Operations– AN OVERVIEW September 2008 (updated 2012) UNESCO IOC Tsunami Unit (Paris) with ITIC (Hawaii)

This overview summarizes an end-to-end tsunami warning. In event time, it covers activities for event monitoring, detection, threat evaluation and warning, alert dissemination, emergency response, and public action. An effective tsunami warning system is achieved when all people in vulnerable coastal communities are prepared to respond appropriately and in a timely manner upon recognizing that a potential destructive tsunami may be approaching. Meeting this challenge requires round-the-clock monitoring with real-time data streams and rapid alerting, as well as prepared communities, a strong emergency management system, and close and effective cooperation and coordination between all stakeholders. To warn without preparing, and further, to warn without providing a public safety message that is understandable to every person about what to do and where to go, is clearly useless. While alerts are the technical trigger for warning, any system will ultimately be judged by its ability to save lives, and by whether people move out of harm's way before a big tsunami hits. Towards these ends, education and awareness are clearly essential activities for successful early warning.

An end-to-end tsunami warning involves a number of stakeholders who must be able to work together and with good understanding of each other's roles, responsibilities, authorities, and action during a tsunami event. Planning and preparedness, and practicing in advance of the real event, helps to familiarize agencies and their staff with the steps and decision-making that need to be carried out without hesitation in a real emergency. Tsunami resilience is built upon a community's preparedness in tsunami knowledge, planning, warning, and awareness. All responding stakeholders should have a basic understanding of earthquake and tsunami science, and be familiar with warning concepts, detection, threat evaluation, and alerting methods, and emergency response and evacuation operations. The key components, requirements, and operations to enable an effective and timely warning and evacuation are covered in the following topics of end to-end tsunami warning:

- Tsunami Science and Hazard Assessment
- Tsunami Risk Reduction Strategy and community-based disaster risk management
- Stakeholders, Roles & Responsibilities, and Standard Operating Procedures (SOPs) and their Linkages
- End-to-end Tsunami Response and SOPs
- Tsunami Warning Focal Point (TWFP) and National Tsunami Warning Centre (NTWC) operations
- Tsunami Emergency Response (TER) operations
- Public Alerting
- The Role of Media
- Evacuation and Signage
- Use of Exercises to Build Preparedness
- Awareness and Education

To ensure the long-term sustainability of a tsunami warning system, it should be noted that:

- Tsunamis should be part of an all-hazards (natural and man-made) strategy.
- System redundancy is required to ensure reliability.
- Clearly understood TWFP/TWC and TER public safety messages are essential. Media partnerships for warning, as well as preparedness, are important.
- Awareness must be continuous forever. Tsunamis are low frequency, high impact natural disasters that are also unpredictable.
- National, provincial, and local Tsunami Coordination Committees ensure stakeholder coordination and implementation of the end-to-end tsunami warning.

For specific details and algorithms and for actual descriptions of tsunami warning and emergency response operations, including data networks and data collection, methods of evaluation and criteria for action, products issued and methods of communication of alerts, and evacuation, original source references or plans should be consulted. These are the high-level system descriptions or concepts of operation, agency operations manuals, and user's guides of each regional and national system.

Basic references providing a comprehensive summary on tsunami warning center and emergency response operations considerations are:

- ITIC IOC Manual on Tsunami Warning Centre Standard Operating Procedures (Guidance and Samples), version 2010 (distributed as part of 2013 SOP capacity building).
- ITIC IOC Manual on Tsunami Emergency Response Standard Operating Procedures (Guidance and Samples), version 2010 (distributed as part of 2013 SOP capacity building)

For a description of the Caribbean tsunami warning system, consult the Pacific Tsunami Warning Center Enhanced Products for the CARIBE-EWS Users Guide (version 1.2 October 8, 2015). It can be accessed at: NWS/CTWP <http://caribewave.info>.

TRAINING

In order to assist countries in strengthening their warning systems, the IOC has compiled and developed a Training Manual containing references, best practices, decision support tools, and guidance materials summarizing key components, requirements, and operations to enable an effective and timely warning and evacuation against tsunamis. The materials were developed under the lead of the ITIC and in close partnership with experienced practitioners in tsunami warning and emergency response, and have been used in numerous training courses since the 2004 Indian Ocean tsunami.

The Manual includes session plans, lectures (in Power Point), exercises, and multi-media materials. Together, they represent part of the IOC's collaborative contribution to national capacity building and training on end-to-end tsunami warning and tsunami standard operating procedures to countries of the Indian Ocean, Pacific, Southeast Asia, and the Caribbean. For more information, please contact Laura Kong, Director, ITIC (laura.kong@noaa.gov), Bernardo Aliaga, IOC (b.aliaga@unesco.org), Christa von Hillebrandt, US NWS Caribbean Tsunami Warning Program (christa.vonh@noaa.gov), or Alison Brome (a.brome@unesco.org). The tables presented below can be used as a guide for preparing the timeline for the exercise.

Table A1. Table to be used as a guide the timing, actions, authority, communication means and target audiences for a tsunami event.

| Tsunami Evacuation Responsibilities Checklist for Government Disaster Response Agencies | | |
|---|------------------------------|--------------|
| This is a simple checklist to use when doing an evacuation. List the agency(ies) / department(s) responsible for actions and recommended number of minutes (e.g. +10 minutes) after earthquake origin time. | Earthquake Origin Time: 0000 | |
| | Agency(ies) / Department(s): | Time (mins): |
| Strong and/or long duration earthquake is felt (vary depending distance from source) | _____ | ± |
| Tsunami message received from tsunami service provider (NTWCs) | _____ | ± |
| Call in staff | _____ | ± |
| Activate emergency centers / Notify public safety agencies | _____ | ± |
| Coordinate sounding of public sirens and alarm notifications | _____ | ± |
| Initiate media notifications and evacuation announcements | _____ | ± |
| Initiate evacuation of people away from coast (Tsunami Evacuation Maps) | _____ | ± |
| Put boats/ships out to sea if wave impact time permits | _____ | ± |
| Setup road-blocks and evacuation routes | _____ | ± |
| Guide people through traffic points to shelter | _____ | ± |
| Initiate recall of disaster response workers | _____ | ± |
| Open and operate refuge centers | _____ | ± |
| Prepare to start electrical generators | _____ | ± |
| If your facility is located in a tsunami evacuation zone: -Prepare to shutoff utilities (e.g. electrical, gas, water) -Protect key equipment (e.g. computers) -Remove key documents (e.g. financial, personal information) | _____ | ± |
| Determine if tsunami has caused coastal damage / injuries and the need to initiate search and rescue operations | _____ | ± |
| Determine when to declare the “all clear” | _____ | ± |
| Prepare for post tsunami impact operations | _____ | ± |
| Do roll call for workers ____ and volunteers | _____ | ± |

Annex B. Example Table Top Exercise

Tabletop Exercise Development Steps

| EVENT | TIME (WHEN) | ACTIVITY (WHAT INFO) | AUTHORITY (WHO) | MEDIUM (HOW) | TO (TARGET) |
|--------------------|-------------|----------------------|-----------------|--------------|-------------|
| EQ Occurs | | | | | |
| Tsunami might come | | | | | |
| Evacuate | | | | | |
| Tsunami comes | | | | | |
| Safe to return | | | | | |

Original 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 in 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.

Annex C. Tsunami Source Scenario Description

Costa Rica Earthquake Scenario

The scenario consists of a rupture of a fault segment along the Caribbean coast of Costa Rica, in the southern Caribbean Sea, with hypocenter at:

- Origin Time 14:00:00 UTC March 21, 2017
- Latitude 9.37°
- Longitude -82.54°
- Depth 25 km
- Magnitude 7.93 – Mw
- Slip 4.2 m
- Shear modulus: 35 GPa
- Seismic Moment: 9.92E+20 N-m

Segment 1

- Corner Point A
 - Latitude: 9.73°
 - Longitude: -83.12°
 - Depth: 25 km
- Corner Point B
 - Latitude: 10.05°
 - Longitude: -82.92°
 - Depth: 5 km
- Corner Point C
 - Latitude: 9.33°
 - Longitude: -81.75°
 - Depth: 5 km
- Corner Point D
 - Latitude: 9.02°
 - Longitude: -81.96°
 - Depth: 25 km
- Strike: 122°
- Dip: 25°
- Rake: 90°
- Length: 150 km
- Width: 45 km
- Width Map View: 40.8 km

Cuba Earthquake Scenario

The scenario consists of a rupture of a fault segment along the southeastern coast of Cuba, in the northwestern portion of the Caribbean Sea, with hypocenter at:

- Origin Time 14:00:00 UTC March 21, 2017
- Latitude 19.625°
- Longitude -76.35°
- Depth 20 km
- Magnitude 8.24 – Mw
- Slip 8 m
- Shear modulus: 33.5 GPa
- Seismic Moment: 2.9E+21 N-m

Segment 1

- Corner Point A
 - Latitude: 19.77°
 - Longitude: -75.07°
 - Depth: 38.79 km
- Corner Point B
 - Latitude: 19.65°
 - Longitude: -75.06°
 - Depth: 1.21 km
- Corner Point C
 - Latitude: 19.48°
 - Longitude: -77.63°
 - Depth: 1.21 km
- Corner Point D
 - Latitude: 19.60°
 - Longitude: -77.64°
 - Depth: 38.79 km
- Strike: 266°
- Dip: 70°
- Rake: 90°
- Length: 270 km
- Width: 40 km
- Width Map View: 13.68 km

Northeastern Antilles Earthquake Scenario

The scenario consists of a rupture of a fault segment along the Northeastern Antilles, in the Southeastern portion of the Caribbean Sea, with hypocenter at:

- Origin Time 14:00:00 UTC March 21, 2017
- Latitude 16.96°
- Longitude -60.69°
- Depth 40km
- Magnitude 8.5 – Mw
- Slip 10 m
- Shear modulus: 50 GPa
- Seismic Moment: 7.16143E+21 N.m

Segment 1

- Corner Point A
 - Latitude: 17.52°
 - Longitude: -61.37°
 - Depth: 62 km
- Corner Point B
 - Latitude: 17.81°
 - Longitude: -61.15°
 - Depth: 15 km
- Corner Point C
 - Latitude: 16.4°
 - Longitude: 60°
 - Depth: 15 km
- Corner Point D
 - Latitude: 16.11°
 - Longitude: 60.23°
 - Depth: 62 km
- Strike: 325°
- Dip: 45°
- Rake: 90°
- Length: 220 km
- Width: 65 km
- Width Map View: 46 km

Tsunami models were computed using the Rapid Inundation Forecasting of Tsunamis (RIFT) model to generate expected impacts throughout the region.

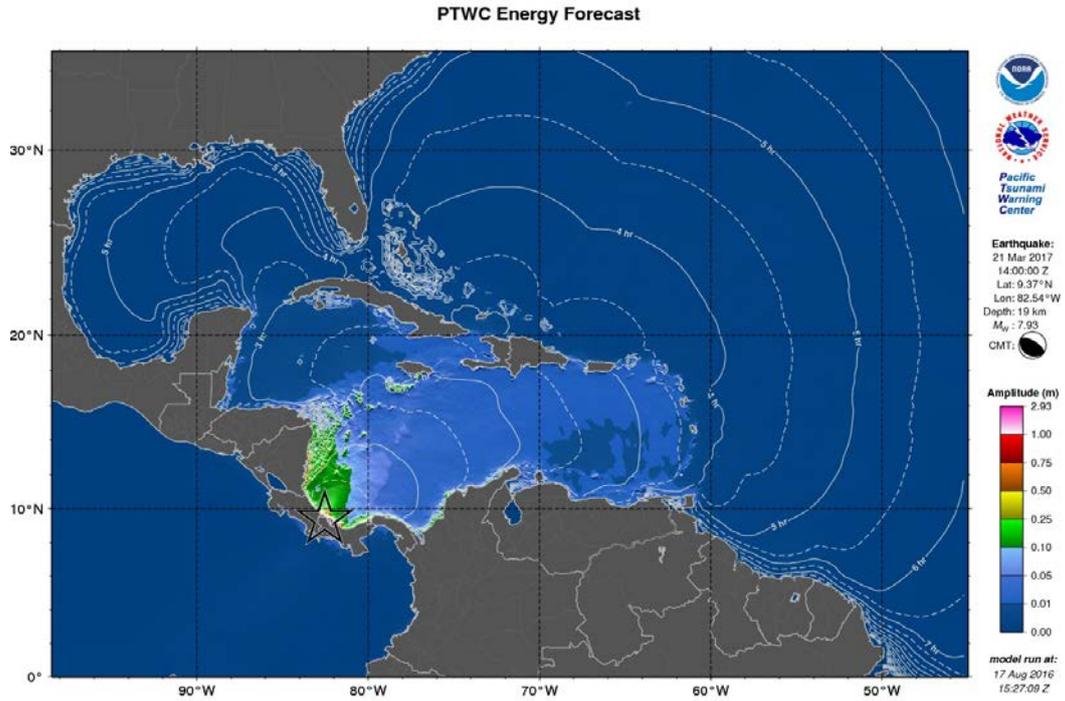


Figure C1. RIFT maximum amplitude map based on the scenario for Costa Rica. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami Warning Centers.

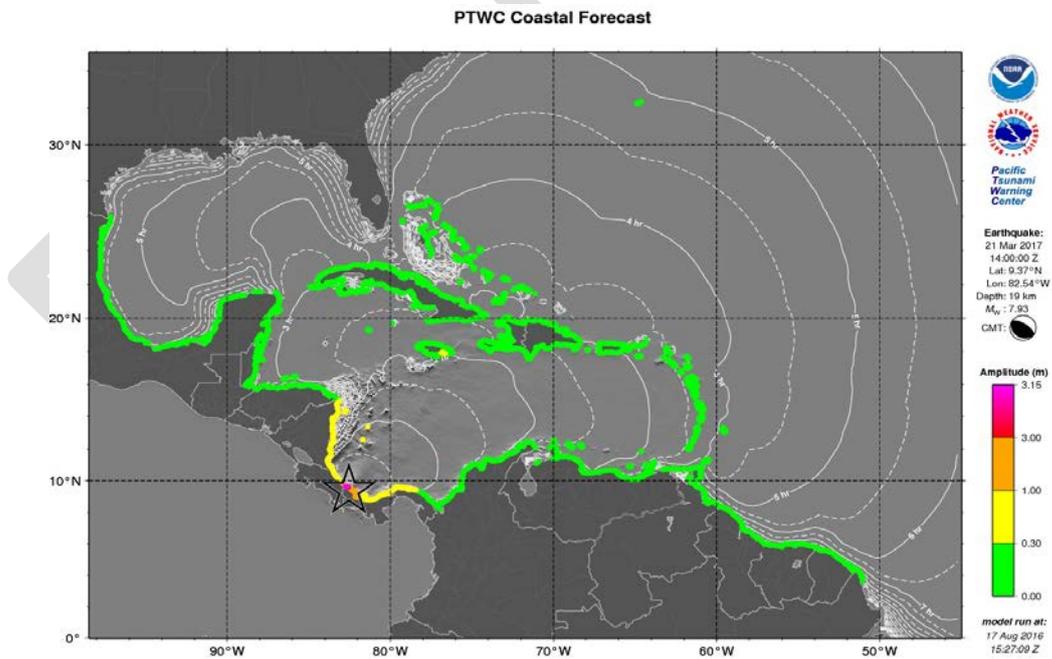


Figure C2. RIFT coastal tsunami amplitude map for the Costa Rica scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami Warning Centers.

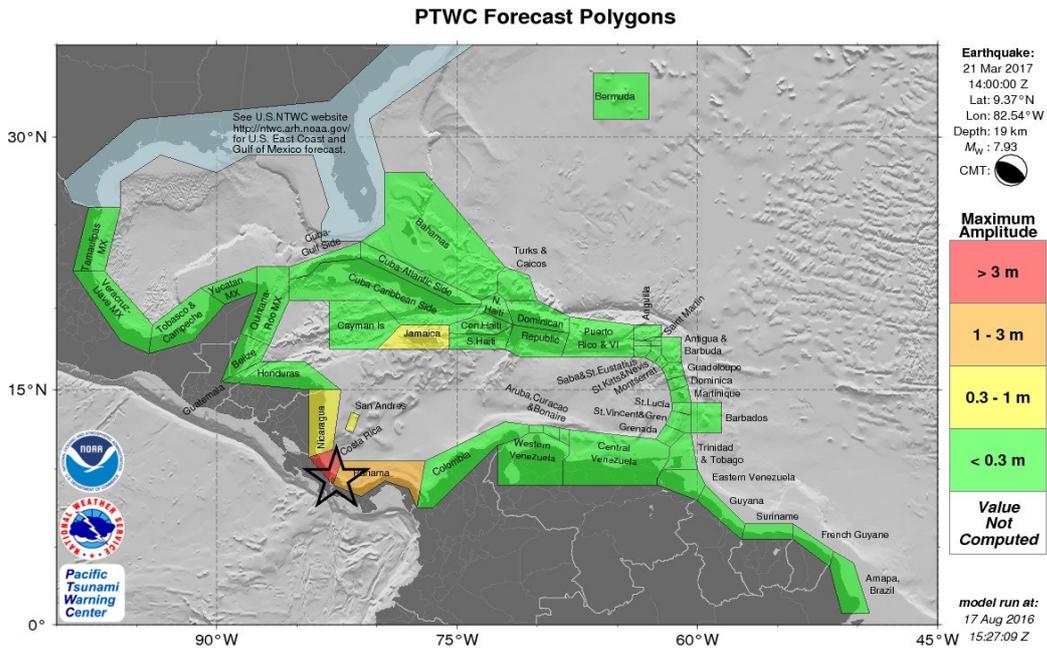


Figure C3. RIFT forecast polygons for the Caribbean region for the Costa Rica scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami Warning Centers.

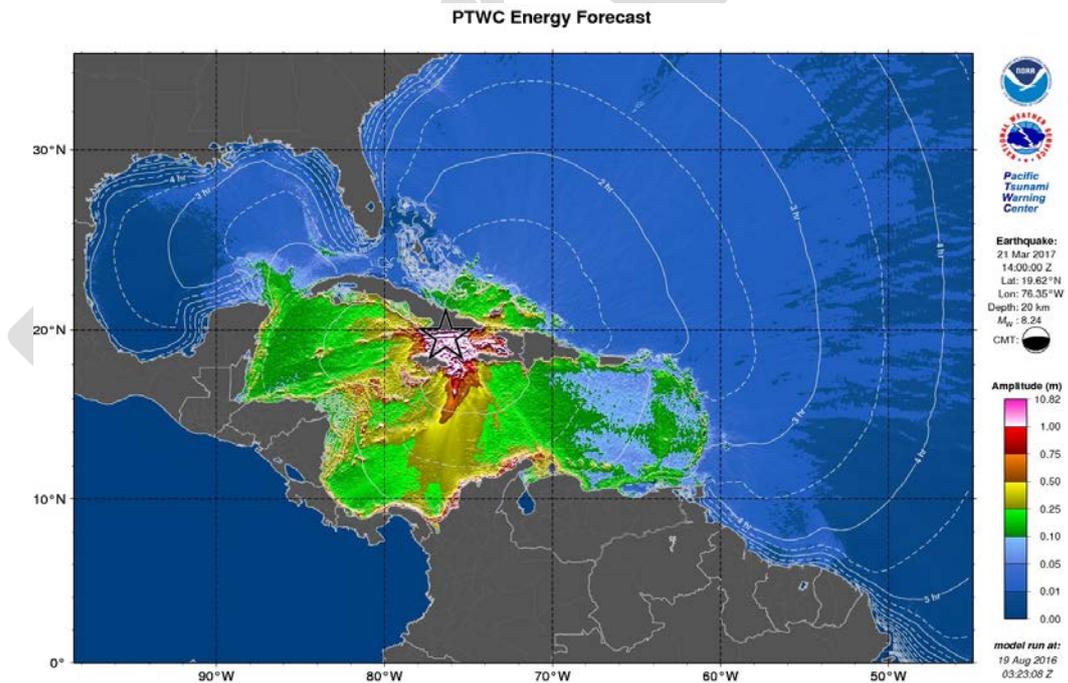


Figure C4. RIFT maximum amplitude map for the Cuba scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami Warning Centers.

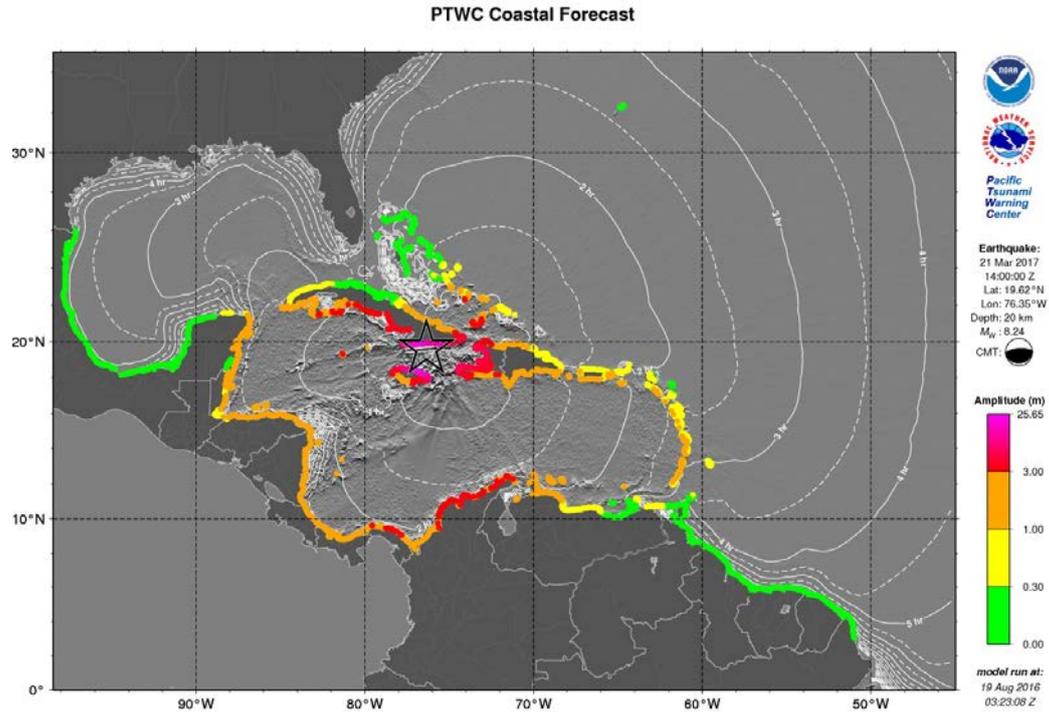


Figure C5. RIFT coastal tsunami amplitude map for the Cuba scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami.

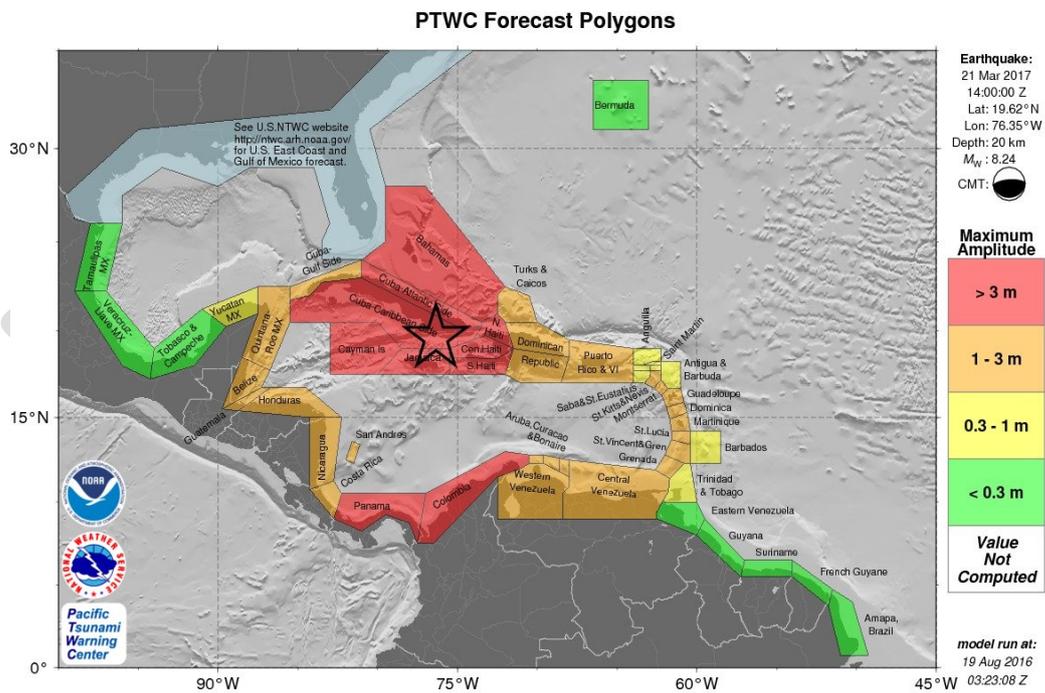


Figure C6. RIFT forecast polygons for the Caribbean region for the Cuba scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami Warning Centers.

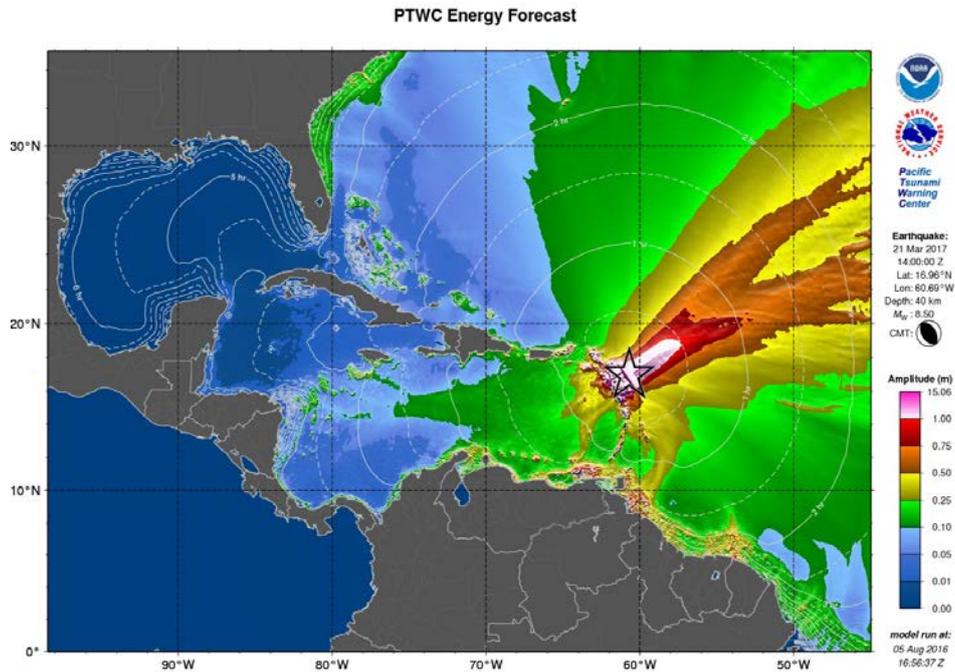


Figure C7. RIFT maximum amplitude map for the Northeastern Antilles scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami Warning Centers.

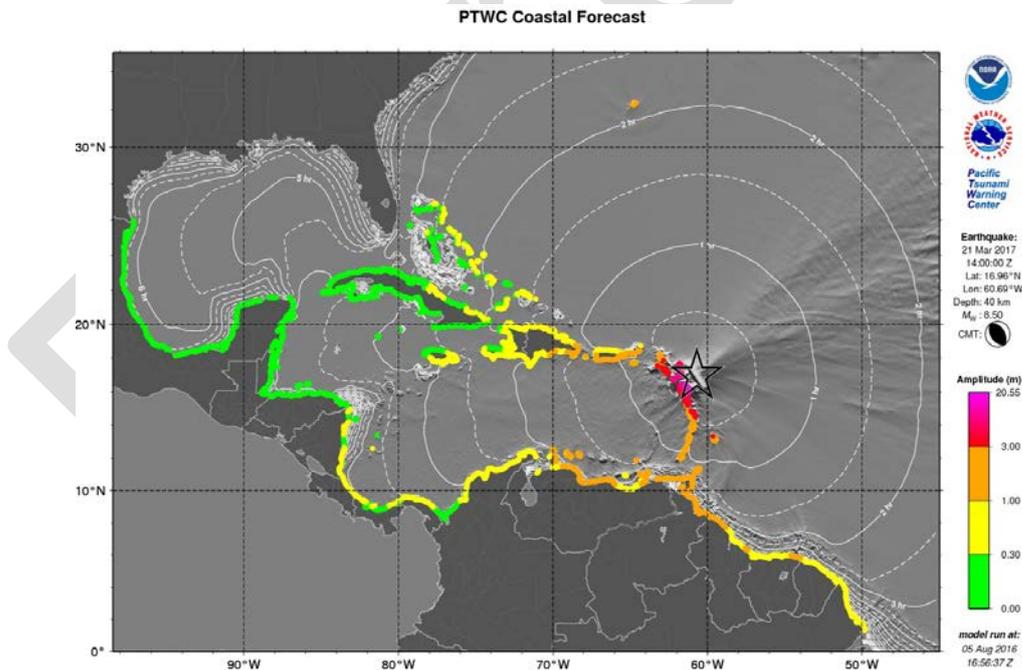


Figure C8. RIFT coastal tsunami amplitude map for the Northeastern Antilles scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami.

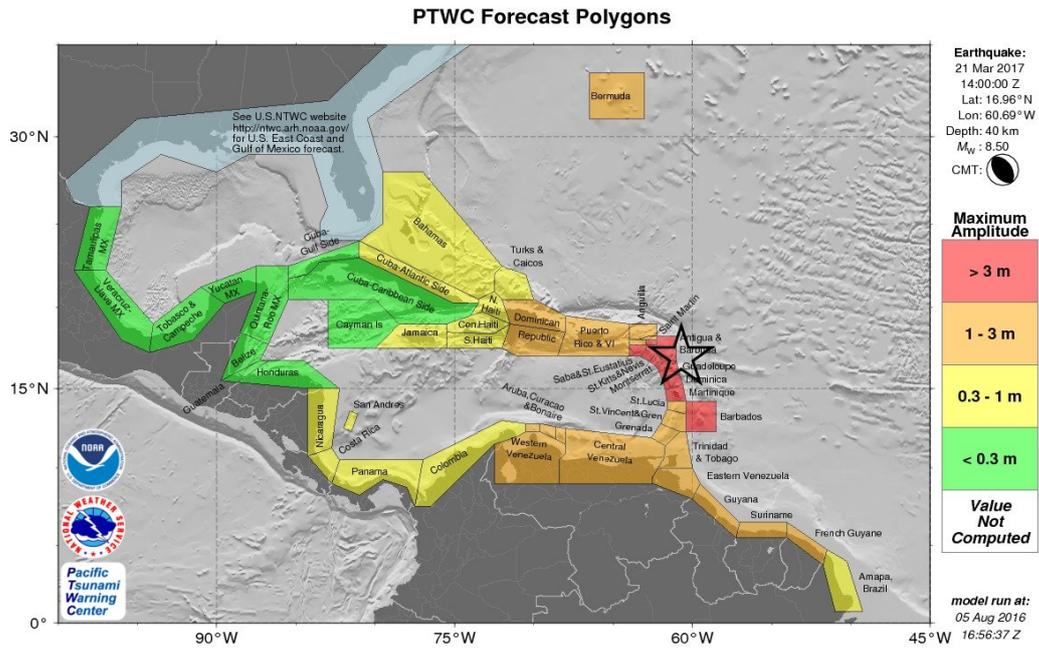


Figure C9. RIFT forecast polygons for the Northeastern Antilles scenario. During a real event this product will only be made available to officially designated Tsunami Warning Focal Points and National Tsunami Warning Centers.

Annex D. Earthquake Impact Scenario

When planning for a tsunami it is important to also take into consideration the potential earthquake impact in areas close to the source, as these impacts can affect tsunami response and increase the tsunami impact by hindering evacuation and contributing debris to be carried by the waves. For earthquake impact, the USGS has developed ShakeMap and the Prompt Assessment of Global Earthquakes for Response (PAGER). The main purpose of ShakeMap is to display the levels of ground shaking produced by the earthquake. The ground shaking events levels in the region are studied depending on the magnitude of the earthquake, distance from the earthquake source, rock and soil behavior in the region and propagation of the seismic waves through the Earth's crust. Based on the output of ShakeMap, PAGER estimates the population exposed to earthquake shaking, fatalities and economic losses.

Earthquake Event

The input information for ShakeMap and PAGER are the four corners of the boxes from the fault plane and the depths at each of these four corners. For the case of Caribe Wave 17, the fault plane is represented by one segment for each of scenarios. The Costa Rica fault plane is 150 km long and 45 km wide. The Cuba fault plane is 270 km long and 40 km wide. The Northeastern Antilles fault plane is 220 km long and 65 km wide.

Figures D1, D2, D3, D4, D5, and D6, show ShakeMap and PAGER outputs for the Caribe Wave 17 earthquake scenarios.

For the Costa Rica the ShakeMap show intensities up to VIII on the Mercalli Modified Scale (Figure D1). The strongest ground shaking is predicted Limon, and the coast of Costa Rica and the intensity decreases further inland. According to the ShakeMap for the Cuba scenario (Figure D3), intensities of up to VII on the Mercalli Modified Scale could be observed. The strongest ground shaking is predicted near Santiago de Cuba and the South coast of Cuba. Moreover, the Northeastern Antilles ShakeMap shows intensities up to VI on the Mercalli Modified Scale (Figure D5). The strongest ground shaking is predicted for Antigua and Barbuda and Guadeloupe.

According to PAGER, (Figure D2, D4 and D6) the Caribe Wave 17 simulated earthquakes would produce earthquake shaking red alert for the Costa Rica and Cuba scenarios, while a yellow alert for the Northeastern Lesser Antilles scenario. For the Costa Rica scenario, while the fatalities are estimated to be significant, extensive economic losses could be expected. For the Cuba scenario, both extensive fatalities and economic losses are estimated for the southern coast of Cuba. In the case of the Northeastern Antilles scenario, some casualties and economic losses could be expected, mostly in Antigua and Barbuda and Guadeloupe.

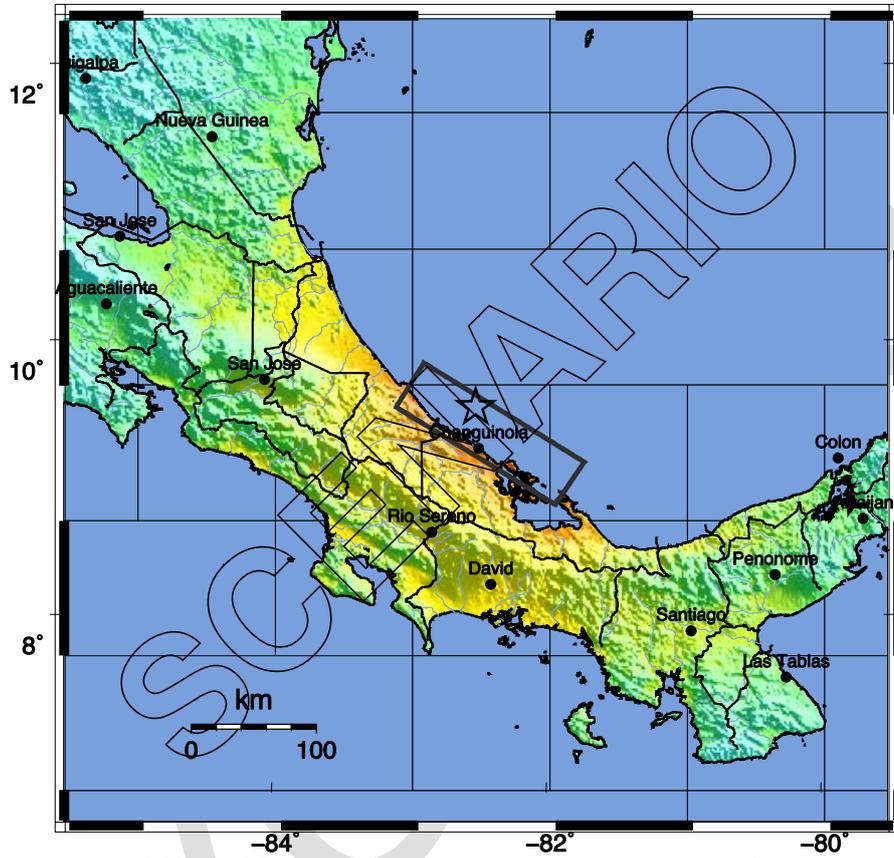
Regarding population exposed to earthquake shaking, it is estimated that almost 225,000 people for Costa Rica scenario, almost 3 million people for Cuba scenario and 173,000 people for the Northeastern Antilles would be exposed to Modified Mercalli intensities from VI up to VIII.

Costa Rica Earthquake Scenario

--- Earthquake Planning Scenario---

ShakeMap for Costa Rica Scenario

Scenario Date: Mar 21, 2017 14:00:00 UTC M 7.9 N9.73 W82.54 Depth: 19.0km



PLANNING SCENARIO ONLY -- Map Version 1 Processed 2016-08-11 15:42:39 UTC

| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|------------------------|----------|--------|-------|------------|--------|-------------|------------|---------|------------|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 12 | 22 | 40 | 75 | >139 |
| PEAK VEL.(cm/s) | <0.02 | 0.1 | 1.4 | 4.7 | 9.6 | 20 | 41 | 86 | >178 |
| INSTRUMENTAL INTENSITY | I | II-III | IV | V | VI | VII | VIII | IX | X+ |

Scale based upon Worden et al. (2012)

Figure D1. Shake map output for the CARIBE WAVE 17 Costa Rica earthquake scenario.



Earthquake Shaking **Red Alert**



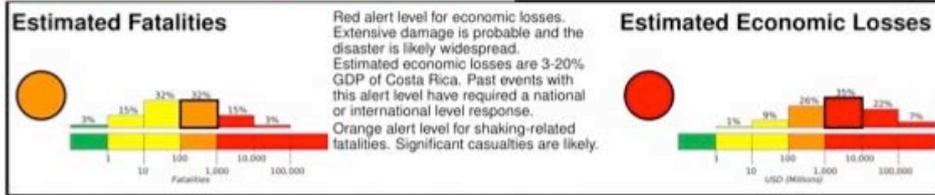
M 7.9, Costa Rica: Caribe Wave 17

Origin Time: 2017-03-21 14:00:00 UTC (08:00:00 local)

Location: 9.73°N 82.54°W Depth: 19km

Created: 40 minutes, 0 seconds after earthquake

FOR TSUNAMI INFORMATION, SEE: tsunami.gov



Estimated Population Exposed to Earthquake Shaking

| | | | | | | | | | | |
|---|-----------------------|---------------|-----------|----------|-----------|-------------|----------------|----------------|-----------|----------|
| ESTIMATED POPULATION EXPOSURE (k = x1000) | --* | --* | 422k* | 3,911k* | 3,137k | 108k | 237k | 0 | 0 | |
| ESTIMATED MODIFIED MERCALLI INTENSITY | I | II-III | IV | V | VI | VII | VIII | IX | X+ | |
| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very Strong | Severe | Violent | Extreme | |
| POTENTIAL DAMAGE | Resistant Structures | none | none | none | V. Light | Light | Moderate | Moderate/Heavy | Heavy | V. Heavy |
| | Vulnerable Structures | none | none | none | Light | Moderate | Moderate/Heavy | Heavy | V. Heavy | V. Heavy |

*Estimated exposure only includes population within the map area

Population Exposure



Structures:

Overall, the population in this region resides in structures that are a mix of vulnerable and earthquake resistant construction. The predominant vulnerable building types are adobe and concrete/cinder block masonry construction.

Historical Earthquakes (with MMI levels):

| Date (UTC) | Dist. (km) | Mag. | Max Shaking MMI(#) | Deaths |
|------------|------------|------|--------------------|--------|
| 1990-12-22 | 187 | 5.9 | VIII(188k) | 1 |
| 1973-04-14 | 274 | 6.5 | VIII(9k) | 26 |
| 1991-04-22 | 58 | 7.6 | VII(213k) | 75 |

Recent earthquakes in this area have caused secondary hazards such as tsunamis, landslides, and liquefaction that might have contributed to losses.

Selected City Exposure

from GeoNames.org

| MMI | City | Population |
|------|------------------|------------|
| VIII | Bocas del Toro | 10k |
| VIII | Sixaola | 2k |
| VIII | Changuinola | 23k |
| VIII | Guabito | 6k |
| VIII | Isla Bastimentos | 2k |
| VIII | Cusapin | 1k |
| VIII | Puerto Limon | 63k |
| VI | David | 83k |
| VI | San Jose | 335k |
| V | Colon | 77k |
| IV | San Andres | 58k |

bold cities appear on map

(k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.

<http://earthquake.usgs.gov/pager>

Event ID: uscosta.rica.m7.9.se

Figure D2. PAGER output for CARIBE WAVE 17 Costa Rica earthquake scenario (USGS).

Cuba Earthquake Scenario

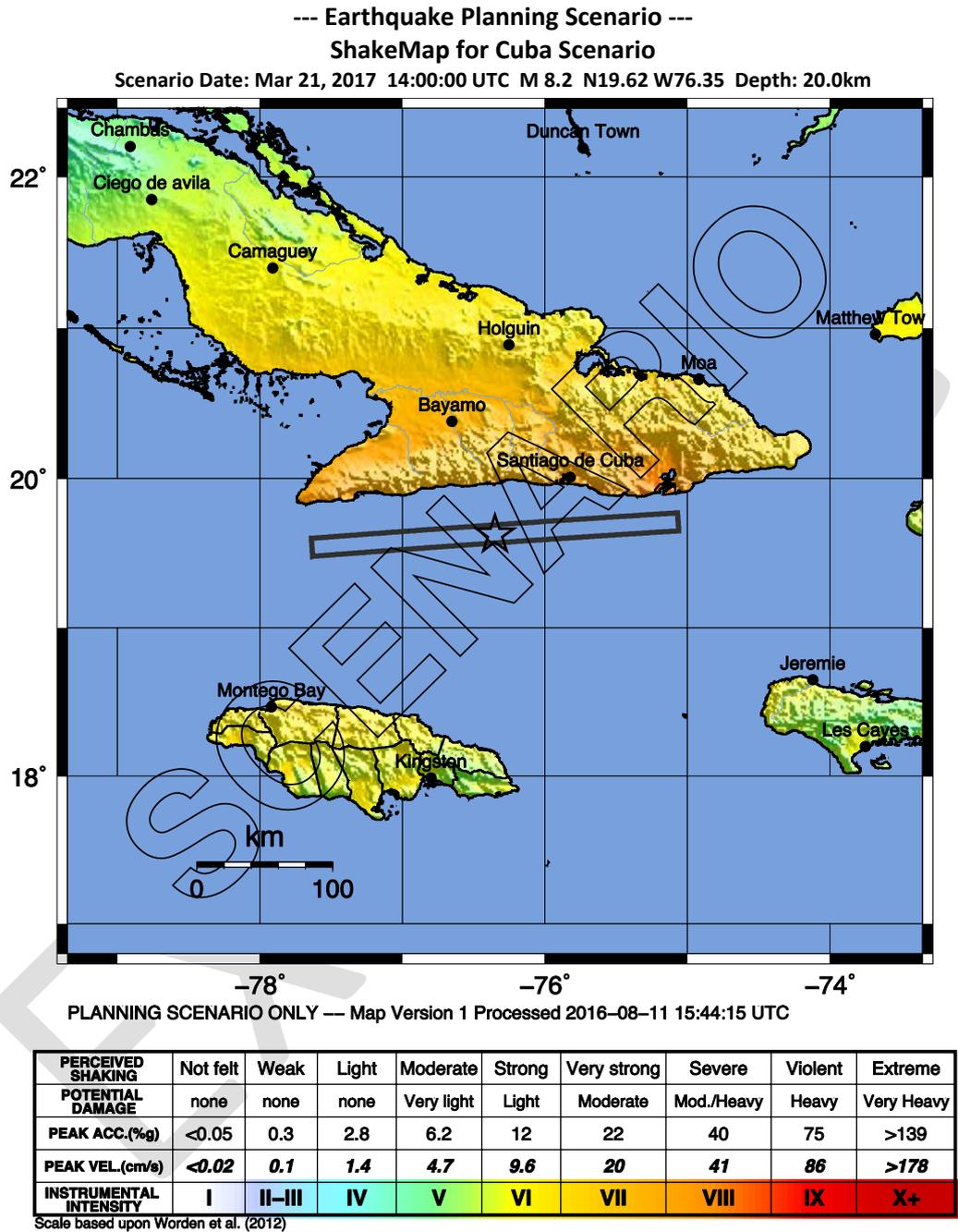


Figure D3. Shake map output for the CARIBE WAVE 17 Cuba earthquake scenario.



Earthquake Shaking **Red Alert**



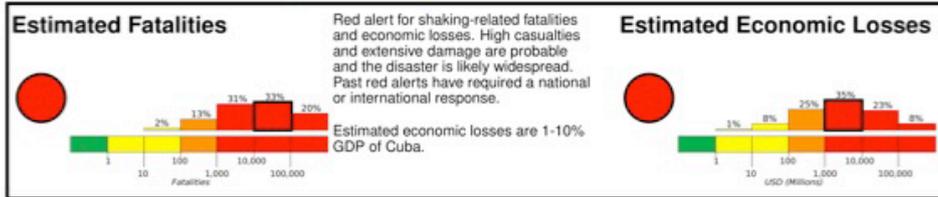
M 8.2, Cuba: Caribe Wave 17

Origin Time: 2017-03-21 14:00:00 UTC (09:00:00 local)

Location: 19.62°N 76.35°W Depth: 20km

FOR TSUNAMI INFORMATION, SEE: tsunami.gov

Created: 45 minutes, 0 seconds after earthquake



Estimated Population Exposed to Earthquake Shaking

| | | | | | | | | | | |
|---|-----------------------|--------|-------|----------|----------|-------------|----------------|----------------|----------|----------|
| ESTIMATED POPULATION EXPOSURE (k = x1000) | -.* | -.* | 7k* | 1,119k* | 4,922k* | 2,387k | 1,018k | 0 | 0 | |
| ESTIMATED MODIFIED MERCALLI INTENSITY | I | II-III | IV | V | VI | VII | VIII | IX | X+ | |
| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very Strong | Severe | Violent | Extreme | |
| POTENTIAL DAMAGE | Resistant Structures | none | none | none | V. Light | Light | Moderate | Moderate/Heavy | Heavy | V. Heavy |
| | Vulnerable Structures | none | none | none | Light | Moderate | Moderate/Heavy | Heavy | V. Heavy | V. Heavy |

*Estimated exposure only includes population within the map area

Population Exposure



Structures:
Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. The predominant vulnerable building types are reinforced concrete and wood construction.

Historical Earthquakes (with MMI levels):

| Date (UTC) | Dist. (km) | Mag. | Max Shaking MMI(#) | Deaths |
|------------|------------|------|--------------------|--------|
| 1998-12-28 | 212 | 5.6 | VI(33k) | 0 |
| 1992-05-25 | 160 | 6.8 | VIII(279) | 0 |
| 1993-01-13 | 176 | 5.5 | VII(2k) | 1 |

Selected City Exposure

from GeoNames.org

| MMI City | Population |
|-----------------------|------------|
| VIII Guantanamo | 273k |
| VIII Palma Soriano | 103k |
| VIII Santiago de Cuba | 556k |
| VIII Niquero | 19k |
| VIII Media Luna | 17k |
| VIII El Cobre | 5k |
| VI Las Tunas | 204k |
| VI Holguín | 319k |
| VI Spanish Town | 145k |
| VI Camaguey | 348k |
| VI Kingston | 938k |

bold cities appear on map (k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.

<http://earthquake.usgs.gov/pager>

Event ID: **uscuba.m8.2.se**

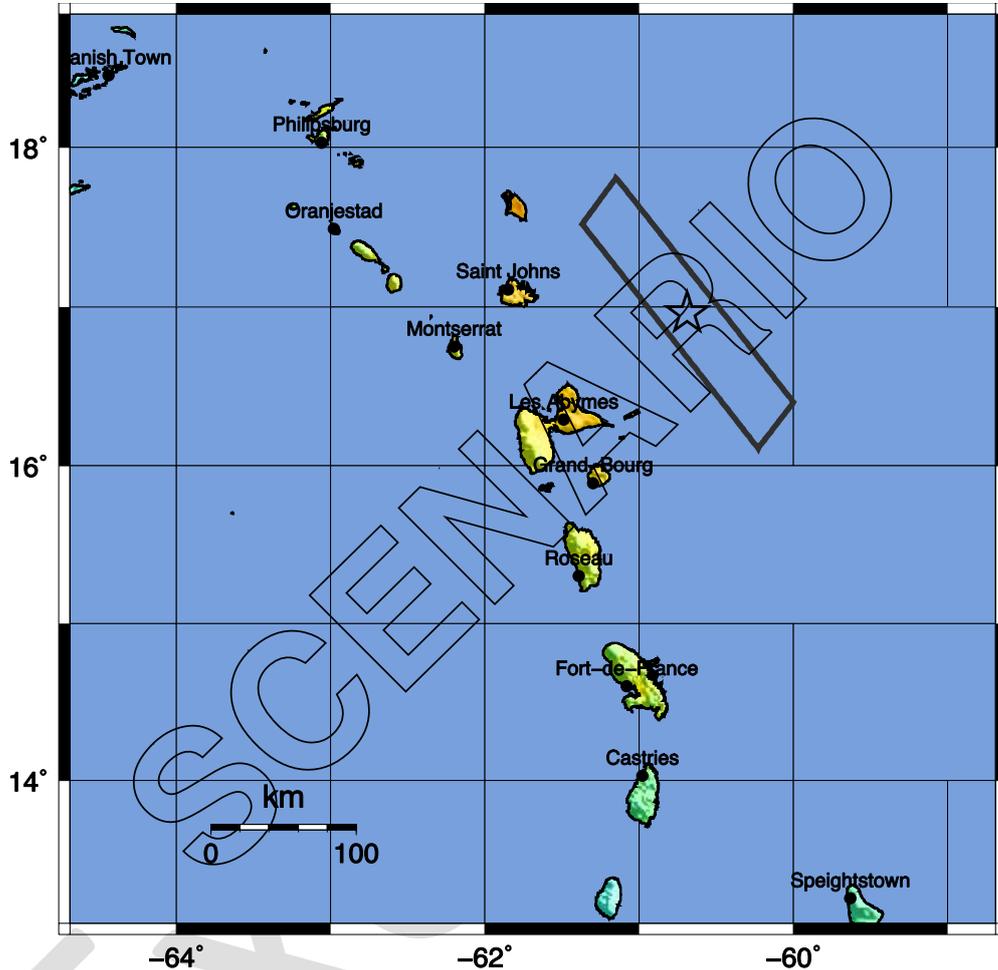
Figure D4. PAGER output for CARIBE WAVE 17 Cuba earthquake scenario (USGS).

Northeastern Antilles earthquake Scenario

--- Earthquake Planning Scenario ---

ShakeMap for Northeastern Antilles Scenario

Scenario Date: Mar 21, 2017 14:00:00 UTC M 8.5 N16.96 W60.69 Depth: 20.0km



PLANNING SCENARIO ONLY -- Map Version 9 Processed 2016-08-12 19:25:02 UTC

| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|------------------------|----------|--------|-------|------------|--------|-------------|------------|---------|------------|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 12 | 22 | 40 | 75 | >139 |
| PEAK VEL.(cm/s) | <0.02 | 0.1 | 1.4 | 4.7 | 9.6 | 20 | 41 | 86 | >178 |
| INSTRUMENTAL INTENSITY | I | II-III | IV | V | VI | VII | VIII | IX | X+ |

Scale based upon Worden et al. (2012)

Figure D5. Shake map output for the CARIBE WAVE 17 Northeastern Antilles earthquake scenario.

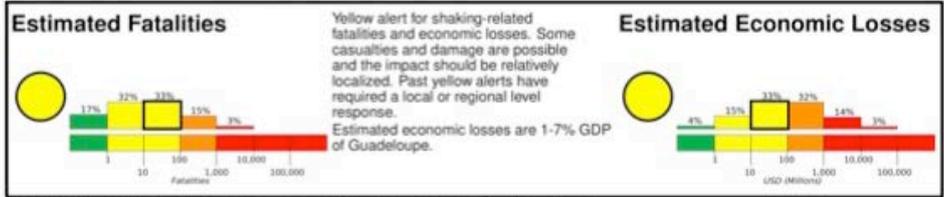
M 8.5, Northeastern Antilles: Caribe Wave 17

Origin Time: 2017-03-21 14:00:00 UTC (10:00:00 local)

Location: 16.96°N 60.69°W Depth: 20km

Created: 48 minutes, 0 seconds after earthquake

FOR TSUNAMI INFORMATION, SEE: tsunami.gov



Estimated Population Exposed to Earthquake Shaking

| ESTIMATED POPULATION EXPOSURE (k = x1000) | -.* | -.* | 171k* | 394k* | 663k* | 364k | 0 | 0 | 0 | |
|---|-----------------------|--------|-------|----------|----------|-------------|----------------|----------------|----------|----------|
| ESTIMATED MODIFIED MERCALLI INTENSITY | I | II-III | IV | V | VI | VII | VIII | IX | X+ | |
| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very Strong | Severe | Violent | Extreme | |
| POTENTIAL DAMAGE | Resistant Structures | none | none | none | V. Light | Light | Moderate | Moderate/Heavy | Heavy | V. Heavy |
| | Vulnerable Structures | none | none | none | Light | Moderate | Moderate/Heavy | Heavy | V. Heavy | V. Heavy |

*Estimated exposure only includes population within the map area



Structures:

Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. The predominant vulnerable building types are reinforced concrete and informal (metal, timber, GI etc.) construction.

Historical Earthquakes (with MMI levels):

| Date (UTC) | Dist. (km) | Mag. | Max Shaking MMI(4) | Deaths |
|------------|------------|------|--------------------|--------|
| 1985-03-16 | 186 | 6.4 | VII(6k) | 0 |
| 1974-10-08 | 143 | 7.5 | VIII(40k) | 0 |
| 2004-11-21 | 179 | 6.3 | VII(3k) | 1 |

Recent earthquakes in this area have caused secondary hazards such as tsunamis that might have contributed to losses.

Selected City Exposure

from GeoNames.org

| MMI | City | Population |
|-----|-----------------|------------|
| VII | Piggotts | <1k |
| VII | Saint John's | 24k |
| VII | Parham | <1k |
| VII | All Saints | 3k |
| VII | Le Moule | 23k |
| VII | Potters Village | 1k |
| VI | Roseau | 17k |
| VI | Basseterre | 13k |
| VI | Fort-de-France | 90k |
| IV | Bridgetown | 99k |
| IV | Kingstown | 25k |

bold cities appear on map (k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.
<http://earthquake.usgs.gov/pager>

Event ID: usnla.m8.5.se

Figure D6. PAGER output for CARIBE WAVE 17 Northeastern Antilles earthquake scenario (USGS).

Annex E. TWC Dummy (Start of Exercise) Messages

PTWC

WECA41 PHEB 211400
TSUCAX

TEST...TSUNAMI EXERCISE MESSAGE NUMBER 1...TEST
NWS PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1400Z 21 MAR 2017

...CARIBEWAVE 17 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 CARIBEWAVE 17 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 CARIBEWAVE.INFO. THE EXERCISE PURPOSE IS TO PROVIDE
EMERGENCY MANAGEMENT A REALISTIC SCENARIO TO TEST TSUNAMI RESPONSE
PLANS.

THIS IS ONLY AN EXERCISE.

\$\$

Annex F. TWC Exercise Messages

Costa Rica Earthquake Scenario

The following messages created for the CARIBE WAVE 17 tsunami exercise are representative of the official standard products issued by the PTWC during a large magnitude 7.93 earthquake and tsunami originating in Costa Rica. During a real event, NTWC and TWFP would be sent via email the graphical products. The alerts would persist longer during a real event than is depicted in this exercise.

PTWC Message #1

ZCZC

WECA41 PHEB 211405
TSUCAX

TSUNAMI MESSAGE NUMBER 1
NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI
1405 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE
UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR
THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL
AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF
ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED
INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.1
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 9.4 NORTH 82.5 WEST
* DEPTH 19 KM / 12 MILES
* LOCATION PANAMA-COSTA RICA BORDER REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.1 OCCURRED IN
THE PANAMA-COSTA RICA BORDER REGION AT 1400 UTC ON TUESDAY
MARCH 21 2017.

- * BASED ON THE PRELIMINARY EARTHQUAKE PARAMETERS... WIDESPREAD
HAZARDOUS TSUNAMI WAVES ARE POSSIBLE.

TSUNAMI THREAT FORECAST

- * HAZARDOUS TSUNAMI WAVES FROM THIS EARTHQUAKE ARE POSSIBLE WITHIN THE NEXT THREE HOURS ALONG SOME COASTS OF

COSTA RICA... PANAMA... SAN ANDRES PROVID... COLOMBIA...
NICARAGUA... HAITI... CAYMAN ISLANDS... ARUBA...
JAMAICA... CUBA... BONAIRE... DOMINICAN REP... BAHAMAS...
CURACAO AND PUERTO RICO

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THE REGION IDENTIFIED WITH A POTENTIAL TSUNAMI THREAT. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|----------------|------------------|-------------|-------|------------|
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1420 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1431 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1445 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1456 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1507 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1507 03/21 |

| | | | | | |
|-----------------|----------------|-------|-------|------|-------|
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1521 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1524 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1526 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1535 | 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1541 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1542 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1556 | 03/21 |
| JACAMEL | HAITI | 18.1N | 72.5W | 1610 | 03/21 |
| CAYMAN BRAC | CAYMAN ISLANDS | 19.7N | 79.9W | 1616 | 03/21 |
| GRAND CAYMAN | CAYMAN ISLANDS | 19.3N | 81.3W | 1624 | 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1625 | 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1627 | 03/21 |
| JEREMIE | HAITI | 18.6N | 74.1W | 1627 | 03/21 |
| SANTIAGO D CUBA | CUBA | 19.9N | 75.8W | 1627 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1631 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1635 | 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1640 | 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1640 | 03/21 |
| CIENFUEGOS | CUBA | 22.0N | 80.5W | 1644 | 03/21 |
| BARACOA | CUBA | 20.4N | 74.5W | 1650 | 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N | 73.7W | 1656 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1700 | 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N | 67.2W | 1700 | 03/21 |
| CAP HAITEN | HAITI | 19.8N | 72.2W | 1701 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.

- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.

- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.

- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #2

ZCZC

WECA41 PHEB 211425

TSUCAX

TSUNAMI MESSAGE NUMBER 2

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1425 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 7.9
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 9.4 NORTH 82.5 WEST
* DEPTH 19 KM / 12 MILES
* LOCATION PANAMA-COSTA RICA BORDER REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 7.9 OCCURRED IN THE PANAMA-COSTA RICA BORDER REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST...UPDATED

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COSTA RICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

PANAMA.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

NICARAGUA... JAMAICA... AND SAN ANDRES AND PROVIDENCIA.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|----------------|------------------|-------------|-------|------------|
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1420 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1431 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1445 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1456 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1507 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1507 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1521 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1526 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1535 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1627 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1640 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 1941 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$
NNNN

PTWC Message #3

ZCZC

WECA41 PHEB 211525

TSUCAX

TSUNAMI MESSAGE NUMBER 3

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1525 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 7.9
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 9.4 NORTH 82.5 WEST
* DEPTH 19 KM / 12 MILES
* LOCATION PANAMA-COSTA RICA BORDER REGION

EVALUATION

* AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 7.9 OCCURRED IN THE PANAMA-COSTA RICA BORDER REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.

* TSUNAMI WAVES HAVE BEEN OBSERVED.

- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COSTA RICA.
- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

PANAMA.
- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

NICARAGUA... JAMAICA... AND SAN ANDRES AND PROVIDENCIA.
- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.
- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT

FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|----------------|------------------|-------------|-------|------------|
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1431 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1445 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1456 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1507 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1507 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1521 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1526 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1535 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1627 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1640 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 1941 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|-------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LOX | | | |
| EL PORVENIR PA | 9.6N | 78.9W | 1505 | 0.38M/ 1.2FT | 24 |
| SAN ANDRES CO | 12.6N | 81.7W | 1455 | 0.48M/ 1.6FT | 22 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1436 | 1.73M/ 5.7FT | 16 |
| LIMON CR | 10.0N | 83.0W | 1425 | 0.91M/ 3.0FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #4

ZCZC

WECA41 PHEB 211625

TSUCAX

TSUNAMI MESSAGE NUMBER 4

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1625 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 7.9
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 9.4 NORTH 82.5 WEST
* DEPTH 19 KM / 12 MILES
* LOCATION PANAMA-COSTA RICA BORDER REGION

EVALUATION

* AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 7.9 OCCURRED IN THE PANAMA-COSTA RICA BORDER REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.

* TSUNAMI WAVES HAVE BEEN OBSERVED.

- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COSTA RICA.
- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

PANAMA.
- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

NICARAGUA... JAMAICA... AND SAN ANDRES AND PROVIDENCIA.
- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.
- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT

FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|----------------|-----------|-------------|-------|------------|
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1526 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1535 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1627 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1640 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 1941 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED

LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD |
|-------------------|-------------------|-------|-----------------|------------------------|-------------|
| | LAT | LON | (UTC) | | (MIN) |
| JACMEL HT | 18.2N | 72.5W | 1621 | 0.13M/ 0.4FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1551 | 0.24M/ 0.8FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1549 | 0.27M/ 0.9FT | 14 |
| COVENAS CO | 9.4N | 76.2W | 1549 | 0.22M/ 0.7FT | 20 |
| EL PORVENIR PA | 9.6N | 78.9W | 1505 | 0.38M/ 1.2FT | 24 |
| SAN ANDRES CO | 12.6N | 81.7W | 1455 | 0.48M/ 1.6FT | 22 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1436 | 1.73M/ 5.7FT | 16 |
| LIMON CR | 10.0N | 83.0W | 1425 | 0.91M/ 3.0FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #5

ZCZC

WECA41 PHEB 211725

TSUCAX

TSUNAMI MESSAGE NUMBER 5

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1725 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 7.9
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 9.4 NORTH 82.5 WEST
* DEPTH 19 KM / 12 MILES
* LOCATION PANAMA-COSTA RICA BORDER REGION

EVALUATION

* AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 7.9 OCCURRED IN THE PANAMA-COSTA RICA BORDER REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.

* TSUNAMI WAVES HAVE BEEN OBSERVED.

- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COSTA RICA.
- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

PANAMA.
- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

NICARAGUA... JAMAICA... AND SAN ANDRES AND PROVIDENCIA.
- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.
- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT

FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

-
- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|----------------|-----------|-------------|-------|------------|
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1627 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1640 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 1941 03/21 |

POTENTIAL IMPACTS

-
- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
 - * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
 - * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
 - * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

-
- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------|-------------------|
| | LAT | LON | | | | |
| ARECIBO PR | 18.5N | 66.7W | 1722 | 0.04M/ | 0.1FT | 14 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1721 | 0.08M/ | 0.3FT | 28 |
| LIMETREE VI | 17.7N | 64.8W | 1716 | 0.09M/ | 0.3FT | 28 |
| ST CROIX VI | 17.7N | 64.7W | 1713 | 0.08M/ | 0.3FT | 22 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1715 | 0.04M/ | 0.1FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1716 | 0.07M/ | 0.2FT | 28 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1719 | 0.11M/ | 0.4FT | 22 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1718 | 0.13M/ | 0.4FT | 28 |
| YABUCOA PR | 18.1N | 65.8W | 1711 | 0.10M/ | 0.3FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1712 | 0.09M/ | 0.3FT | 18 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1709 | 0.04M/ | 0.1FT | 20 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1706 | 0.08M/ | 0.3FT | 24 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1707 | 0.04M/ | 0.1FT | 26 |
| PUNTA CANA DO | 18.5N | 68.4W | 1703 | 0.09M/ | 0.3FT | 18 |
| MONA ISLAND PR | 18.1N | 67.9W | 1657 | 0.09M/ | 0.3FT | 26 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1639 | 0.06M/ | 0.2FT | 26 |
| BARAHONA DO | 18.2N | 71.1W | 1646 | 0.13M/ | 0.4FT | 26 |
| PORT ROYAL JM | 17.9N | 76.8W | 1638 | 0.33M/ | 1.1FT | 20 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1640 | 0.16M/ | 0.5FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1633 | 0.04M/ | 0.1FT | 22 |
| JACMEL HT | 18.2N | 72.5W | 1621 | 0.13M/ | 0.4FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1551 | 0.24M/ | 0.8FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1549 | 0.27M/ | 0.9FT | 14 |
| COVENAS CO | 9.4N | 76.2W | 1549 | 0.22M/ | 0.7FT | 20 |
| EL PORVENIR PA | 9.6N | 78.9W | 1505 | 0.38M/ | 1.2FT | 24 |
| SAN ANDRES CO | 12.6N | 81.7W | 1455 | 0.48M/ | 1.6FT | 22 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1436 | 1.73M/ | 5.7FT | 16 |
| LIMON CR | 10.0N | 83.0W | 1425 | 0.91M/ | 3.0FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

* THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.

* AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.

* FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT
PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.

* COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS...
AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC
TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE
PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

* COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND
THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S.
NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND
AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

PTWC Message #6

ZCZC

WECA41 PHEB 211825

TSUCAX

TSUNAMI MESSAGE NUMBER 6

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1825 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 7.9
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 9.4 NORTH 82.5 WEST
* DEPTH 19 KM / 12 MILES
* LOCATION PANAMA-COSTA RICA BORDER REGION

EVALUATION

* AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 7.9 OCCURRED IN THE PANAMA-COSTA RICA BORDER REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.

* TSUNAMI WAVES HAVE BEEN OBSERVED.

- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COSTA RICA.
- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

PANAMA.
- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

NICARAGUA... JAMAICA... AND SAN ANDRES AND PROVIDENCIA.
- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.
- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | ETA(UTC) |
|----------------|-----------|-------------|------------|
| PUERTO CABEZAS | NICARAGUA | 14.0N 83.4W | 1941 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------|-------------------|
| | LAT | Lon | | | | |
| SAINT MARTIN FR | 18.1N | 63.1W | 1803 | 0.06M/ | 0.2FT | 28 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1803 | 0.07M/ | 0.2FT | 18 |
| POINT A PITRE GP | 16.2N | 61.5W | 1757 | 0.05M/ | 0.2FT | 14 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1752 | 0.07M/ | 0.2FT | 18 |
| CALLIAQUA VC | 13.1N | 61.2W | 1750 | 0.06M/ | 0.2FT | 24 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1753 | 0.04M/ | 0.1FT | 26 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1755 | 0.06M/ | 0.2FT | 22 |
| ISLA MUJERES | 21.2N | 86.7W | 1751 | 0.05M/ | 0.2FT | 22 |
| ROSEAU DM | 15.3N | 61.4W | 1746 | 0.07M/ | 0.2FT | 26 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1744 | 0.05M/ | 0.2FT | 16 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1744 | 0.07M/ | 0.2FT | 22 |
| BASSETERRE KN | 17.3N | 62.7W | 1740 | 0.05M/ | 0.2FT | 26 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1740 | 0.04M/ | 0.1FT | 22 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1737 | 0.14M/ | 0.5FT | 18 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1731 | 0.06M/ | 0.2FT | 28 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1732 | 0.04M/ | 0.1FT | 24 |
| ARECIBO PR | 18.5N | 66.7W | 1722 | 0.04M/ | 0.1FT | 14 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1727 | 0.05M/ | 0.2FT | 26 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1721 | 0.08M/ | 0.3FT | 28 |
| LIMETREE VI | 17.7N | 64.8W | 1716 | 0.09M/ | 0.3FT | 28 |
| ST CROIX VI | 17.7N | 64.7W | 1713 | 0.08M/ | 0.3FT | 22 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1715 | 0.04M/ | 0.1FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1716 | 0.07M/ | 0.2FT | 28 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1719 | 0.11M/ | 0.4FT | 22 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1718 | 0.13M/ | 0.4FT | 28 |
| YABUCOA PR | 18.1N | 65.8W | 1711 | 0.10M/ | 0.3FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1712 | 0.09M/ | 0.3FT | 18 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1709 | 0.04M/ | 0.1FT | 20 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1706 | 0.08M/ | 0.3FT | 24 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1707 | 0.04M/ | 0.1FT | 26 |
| PUNTA CANA DO | 18.5N | 68.4W | 1703 | 0.09M/ | 0.3FT | 18 |
| MONA ISLAND PR | 18.1N | 67.9W | 1657 | 0.09M/ | 0.3FT | 26 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1639 | 0.06M/ | 0.2FT | 26 |
| BARAHONA DO | 18.2N | 71.1W | 1646 | 0.13M/ | 0.4FT | 26 |
| PORT ROYAL JM | 17.9N | 76.8W | 1638 | 0.33M/ | 1.1FT | 20 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1640 | 0.16M/ | 0.5FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1633 | 0.04M/ | 0.1FT | 22 |
| JACMEL HT | 18.2N | 72.5W | 1621 | 0.13M/ | 0.4FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1551 | 0.24M/ | 0.8FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1549 | 0.27M/ | 0.9FT | 14 |
| COVENAS CO | 9.4N | 76.2W | 1549 | 0.22M/ | 0.7FT | 20 |

| | | | | | | |
|-------------------|-------|-------|------|--------|-------|----|
| EL PORVENIR PA | 9.6N | 78.9W | 1505 | 0.38M/ | 1.2FT | 24 |
| SAN ANDRES CO | 12.6N | 81.7W | 1455 | 0.48M/ | 1.6FT | 22 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1436 | 1.73M/ | 5.7FT | 16 |
| LIMON CR | 10.0N | 83.0W | 1425 | 0.91M/ | 3.0FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$
NNNN

PTWC Message #7

ZCZC

WECA41 PHEB 211925

TSUCAX

TSUNAMI MESSAGE NUMBER 7

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1925 UTC TUE MAR 21 2017

...FINAL TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 7.9
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 9.4 NORTH 82.5 WEST
* DEPTH 19 KM / 12 MILES
* LOCATION PANAMA-COSTA RICA BORDER REGION

EVALUATION

* AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 7.9 OCCURRED IN THE PANAMA-COSTA RICA BORDER REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.

* BASED ON ALL AVAILABLE DATA... THE TSUNAMI THREAT FROM THIS EARTHQUAKE HAS PASSED AND THERE IS NO FURTHER THREAT.

TSUNAMI THREAT FORECAST...UPDATED

- * THE TSUNAMI THREAT HAS NOW LARGELY PASSED.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR ANY IMPACTED COASTAL AREAS SHOULD MONITOR CONDITIONS AT THE COAST TO DETERMINE IF AND WHEN IT IS SAFE TO RESUME NORMAL ACTIVITIES.
- * PERSONS LOCATED NEAR IMPACTED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM LOCAL AUTHORITIES.
- * REMAIN OBSERVANT AND EXERCISE NORMAL CAUTION NEAR THE SEA.

POTENTIAL IMPACTS

- * MINOR SEA LEVEL FLUCTUATIONS OF UP TO 1 FOOT ABOVE AND BELOW THE NORMAL TIDE MAY CONTINUE OVER THE NEXT FEW HOURS.

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THIS WILL BE THE FINAL STATEMENT ISSUED FOR THIS EVENT UNLESS NEW INFORMATION IS RECEIVED OR THE SITUATION CHANGES.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

* COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND
THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S.
NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND
AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

Cuba Earthquake Scenario

The following messages created for the CARIBE WAVE 17 tsunami exercise are representative of the official standard products issued by the PTWC during a large magnitude 8.24 earthquake and tsunami originating in southeastern coast of Cuba. During a real event, the TWCs would also issue graphical and html-based products to their web sites and via RSS. The alerts would persist longer during a real event than is depicted in this exercise.

PTWC Message #1

ZCZC

WECA41 PHEB 211405

TSUCAX

TSUNAMI MESSAGE NUMBER 1

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1405 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.0
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.0 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * BASED ON THE PRELIMINARY EARTHQUAKE PARAMETERS... WIDESPREAD HAZARDOUS TSUNAMI WAVES ARE POSSIBLE.

TSUNAMI THREAT FORECAST

- * HAZARDOUS TSUNAMI WAVES FROM THIS EARTHQUAKE ARE POSSIBLE WITHIN THE NEXT THREE HOURS ALONG SOME COASTS OF

CUBA... HAITI... CAYMAN ISLANDS... JAMAICA... BAHAMAS...
TURKS N CAICOS... DOMINICAN REP... PUERTO RICO...
MEXICO... COLOMBIA... HONDURAS... ARUBA... BONAIRE... SAN
ANDRES PROVID... US VIRGIN IS... BR VIRGIN IS... PANAMA...
SABA... SINT MAARTEN... ANGUILLA... SINT EUSTATIUS...
CURACAO... SAINT KITTS... MONTSERRAT... VENEZUELA... COSTA
RICA... GUADELOUPE... BARBUDA... DOMINICA... SAINT
MARTIN... BERMUDA... ANTIGUA... SAINT BARTHELEMY... SAINT
LUCIA... MARTINIQUE... SAINT VINCENT... BELIZE... GRENADA
AND BARBADOS

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THE REGION IDENTIFIED WITH A POTENTIAL TSUNAMI THREAT. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | ETA(UTC) |
|-----------------|--------|-------------|------------|
| SANTIAGO D CUBA | CUBA | 19.9N 75.8W | 1405 03/21 |
| JEREMIE | HAITI | 18.6N 74.1W | 1425 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| CAYMAN BRAC | CAYMAN ISLANDS | 19.7N | 79.9W | 1429 | 03/21 |
| BARACOA | CUBA | 20.4N | 74.5W | 1435 | 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1441 | 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N | 73.7W | 1441 | 03/21 |
| GRAND CAYMAN | CAYMAN ISLANDS | 19.3N | 81.3W | 1445 | 03/21 |
| CAP HAITEN | HAITI | 19.8N | 72.2W | 1446 | 03/21 |
| JACAMEL | HAITI | 18.1N | 72.5W | 1450 | 03/21 |
| WEST CAICOS | TURKS N CAICOS | 21.7N | 72.5W | 1451 | 03/21 |
| CIENFUEGOS | CUBA | 22.0N | 80.5W | 1451 | 03/21 |
| GIBARA | CUBA | 21.1N | 76.1W | 1454 | 03/21 |
| MAYAGUANA | BAHAMAS | 22.3N | 73.0W | 1455 | 03/21 |
| PUERTO PLATA | DOMINICAN REP | 19.8N | 70.7W | 1457 | 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1504 | 03/21 |
| GRAND TURK | TURKS N CAICOS | 21.5N | 71.1W | 1506 | 03/21 |
| LONG ISLAND | BAHAMAS | 23.3N | 75.1W | 1514 | 03/21 |
| SAN SALVADOR | BAHAMAS | 24.1N | 74.5W | 1515 | 03/21 |
| EXUMA | BAHAMAS | 23.6N | 75.9W | 1525 | 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1527 | 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1528 | 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N | 74.1W | 1529 | 03/21 |
| CAT ISLAND | BAHAMAS | 24.4N | 75.5W | 1533 | 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N | 67.2W | 1535 | 03/21 |
| SAN JUAN | PUERTO RICO | 18.5N | 66.1W | 1537 | 03/21 |
| CABO ENGANO | DOMINICAN REP | 18.6N | 68.3W | 1537 | 03/21 |
| ELEUTHERA ISLAN | BAHAMAS | 25.2N | 76.1W | 1541 | 03/21 |
| COZUMEL | MEXICO | 20.5N | 87.0W | 1543 | 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1546 | 03/21 |
| PUERTO CORTES | HONDURAS | 15.9N | 88.0W | 1547 | 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1547 | 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1550 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1553 | 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1553 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1556 | 03/21 |
| CHRISTIANSTED | US VIRGIN IS | 17.7N | 64.7W | 1559 | 03/21 |
| ANEGADA | BR VIRGIN IS | 18.8N | 64.3W | 1601 | 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1602 | 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1602 | 03/21 |
| LA HABANA | CUBA | 23.2N | 82.4W | 1607 | 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1608 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1608 | 03/21 |
| SABA | SABA | 17.6N | 63.2W | 1610 | 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1614 | 03/21 |
| SIMPSON BAAI | SINT MAARTEN | 18.0N | 63.1W | 1616 | 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1617 | 03/21 |
| THE VALLEY | ANGUILLA | 18.3N | 63.1W | 1617 | 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| SINT EUSTATIUS | SINT EUSTATIUS | 17.5N | 63.0W | 1618 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1619 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1619 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1622 | 03/21 |
| CHARLOTTE AMALI | US VIRGIN IS | 18.3N | 64.9W | 1624 | 03/21 |
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1625 | 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1625 | 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1627 | 03/21 |
| PLYMOUTH | MONTSERRAT | 16.7N | 62.2W | 1629 | 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1629 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1629 | 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1632 | 03/21 |
| TRUJILLO | HONDURAS | 15.9N | 86.0W | 1633 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1634 | 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1634 | 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1637 | 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1638 | 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1638 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1639 | 03/21 |
| RUTHS BAY | BERMUDA | 32.4N | 64.6W | 1640 | 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1640 | 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1642 | 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1643 | 03/21 |
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1645 | 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1647 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1649 | 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1650 | 03/21 |
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1654 | 03/21 |
| BELIZE CITY | BELIZE | 17.5N | 88.2W | 1656 | 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1700 | 03/21 |
| SAINT GEORGES | GRENADA | 12.0N | 61.8W | 1703 | 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1703 | 03/21 |

POTENTIAL IMPACTS

* A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.

* IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.

- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$
NNNN

PTWC Message #2

ZCZC

WECA41 PHEB 211425

TSUCAX

TSUNAMI MESSAGE NUMBER 2

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1425 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST...UPDATED

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COLOMBIA... CUBA... HAITI... PANAMA... BAHAMAS... CAYMAN ISLANDS... AND JAMAICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

BELIZE... COSTA RICA... DOMINICAN REPUBLIC... GUATEMALA... HONDURAS... MEXICO... NICARAGUA... VENEZUELA... ARUBA... BONAIRE... CURACAO... DOMINICA... GRENADA... GUADELOUPE... MARTINIQUE... MONTSERRAT... PUERTO RICO AND VIRGIN ISLANDS... SAINT KITTS AND NEVIS... SAINT LUCIA... SAINT VINCENT AND THE GRENADINES... SAN ANDRES AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANGUILLA... ANTIGUA AND BARBUDA... BARBADOS... SABA AND SAINT EUSTATIUS... SAINT BARTHELEMY... SINT MAARTEN... SAINT MARTIN... AND TRINIDAD AND TOBAGO.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | ETA (UTC) |
|-----------------|----------------|-------------|------------|
| SANTIAGO D CUBA | CUBA | 19.9N 75.8W | 1405 03/21 |
| JEREMIE | HAITI | 18.6N 74.1W | 1425 03/21 |
| CAYMAN BRAC | CAYMAN ISLANDS | 19.7N 79.9W | 1429 03/21 |
| BARACOA | CUBA | 20.4N 74.5W | 1435 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N 77.9W | 1441 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N 73.7W | 1441 03/21 |
| GRAND CAYMAN | CAYMAN ISLANDS | 19.3N 81.3W | 1445 03/21 |
| CAP HAITEN | HAITI | 19.8N 72.2W | 1446 03/21 |
| JACAMEL | HAITI | 18.1N 72.5W | 1450 03/21 |
| WEST CAICOS | TURKS N CAICOS | 21.7N 72.5W | 1451 03/21 |
| CIENFUEGOS | CUBA | 22.0N 80.5W | 1451 03/21 |
| GIBARA | CUBA | 21.1N 76.1W | 1454 03/21 |
| MAYAGUANA | BAHAMAS | 22.3N 73.0W | 1455 03/21 |
| PUERTO PLATA | DOMINICAN REP | 19.8N 70.7W | 1457 03/21 |
| KINGSTON | JAMAICA | 17.9N 76.9W | 1504 03/21 |
| GRAND TURK | TURKS N CAICOS | 21.5N 71.1W | 1506 03/21 |
| LONG ISLAND | BAHAMAS | 23.3N 75.1W | 1514 03/21 |
| SAN SALVADOR | BAHAMAS | 24.1N 74.5W | 1515 03/21 |
| EXUMA | BAHAMAS | 23.6N 75.9W | 1525 03/21 |
| PORT AU PRINCE | HAITI | 18.5N 72.4W | 1527 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N 69.9W | 1528 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N 74.1W | 1529 03/21 |
| CAT ISLAND | BAHAMAS | 24.4N 75.5W | 1533 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N 67.2W | 1535 03/21 |
| SAN JUAN | PUERTO RICO | 18.5N 66.1W | 1537 03/21 |
| CABO ENGANO | DOMINICAN REP | 18.6N 68.3W | 1537 03/21 |
| ELEUTHERA ISLAN | BAHAMAS | 25.2N 76.1W | 1541 03/21 |
| COZUMEL | MEXICO | 20.5N 87.0W | 1543 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1546 | 03/21 |
| PUERTO CORTES | HONDURAS | 15.9N | 88.0W | 1547 | 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1547 | 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1550 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1553 | 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1553 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1556 | 03/21 |
| CHRISTIANSTED | US VIRGIN IS | 17.7N | 64.7W | 1559 | 03/21 |
| ANEGADA | BR VIRGIN IS | 18.8N | 64.3W | 1601 | 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1602 | 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1602 | 03/21 |
| LA HABANA | CUBA | 23.2N | 82.4W | 1607 | 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1608 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1608 | 03/21 |
| SABA | SABA | 17.6N | 63.2W | 1610 | 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1614 | 03/21 |
| SIMPSON BAAI | SINT MAARTEN | 18.0N | 63.1W | 1616 | 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1617 | 03/21 |
| THE VALLEY | ANGUILLA | 18.3N | 63.1W | 1617 | 03/21 |
| SINT EUSTATIUS | SINT EUSTATIUS | 17.5N | 63.0W | 1618 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1619 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1619 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1622 | 03/21 |
| CHARLOTTE AMALI | US VIRGIN IS | 18.3N | 64.9W | 1624 | 03/21 |
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1625 | 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1625 | 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1627 | 03/21 |
| PLYMOUTH | MONTSERRAT | 16.7N | 62.2W | 1629 | 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1629 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1629 | 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1632 | 03/21 |
| TRUJILLO | HONDURAS | 15.9N | 86.0W | 1633 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1634 | 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1634 | 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1637 | 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1638 | 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1638 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1639 | 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1640 | 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1642 | 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1643 | 03/21 |
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1645 | 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1647 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1649 | 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1650 | 03/21 |

| | | | | | |
|-----------------|-----------------|-------|-------|------|-------|
| BAIE BLANCHE | SAINTE MARTIN | 18.1N | 63.0W | 1654 | 03/21 |
| BELIZE CITY | BELIZE | 17.5N | 88.2W | 1656 | 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1700 | 03/21 |
| SAINTE GEORGES | GRENADA | 12.0N | 61.8W | 1703 | 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1703 | 03/21 |
| SANTA CRZ D SUR | CUBA | 20.7N | 78.0W | 1715 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1722 | 03/21 |
| PUERTO BARRIOS | GUATEMALA | 15.7N | 88.6W | 1739 | 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1745 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1809 | 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1817 | 03/21 |
| NUEVA GERONA | CUBA | 21.9N | 82.8W | 1853 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1908 | 03/21 |
| PROGRESO | MEXICO | 21.3N | 89.7W | 1928 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 2024 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2036 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.

* FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT
PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.

* COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS...
AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC
TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE
PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

* COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND
THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S.
NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND
AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

PTWC Message #3

ZCZC

WECA41 PHEB 211525

TSUCAX

TSUNAMI MESSAGE NUMBER 3

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1525 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COLOMBIA... CUBA... HAITI... PANAMA... BAHAMAS... CAYMAN ISLANDS... AND JAMAICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

BELIZE... COSTA RICA... DOMINICAN REPUBLIC... GUATEMALA... HONDURAS... MEXICO... NICARAGUA... VENEZUELA... ARUBA... BONAIRE... CURACAO... DOMINICA... GRENADA... GUADELOUPE... MARTINIQUE... MONTSERRAT... PUERTO RICO AND VIRGIN ISLANDS... SAINT KITTS AND NEVIS... SAINT LUCIA... SAINT VINCENT AND THE GRENADINES... SAN ANDRES AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANGUILLA... ANTIGUA AND BARBUDA... BARBADOS... SABA AND SAINT EUSTATIUS... SAINT BARTHELEMY... SINT MAARTEN... SAINT MARTIN... AND TRINIDAD AND TOBAGO.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) | |
|-----------------|----------------|-------------|-------|----------|-------|
| JEREMIE | HAITI | 18.6N | 74.1W | 1425 | 03/21 |
| CAYMAN BRAC | CAYMAN ISLANDS | 19.7N | 79.9W | 1429 | 03/21 |
| BARACOA | CUBA | 20.4N | 74.5W | 1435 | 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1441 | 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N | 73.7W | 1441 | 03/21 |
| GRAND CAYMAN | CAYMAN ISLANDS | 19.3N | 81.3W | 1445 | 03/21 |
| CAP HAITEN | HAITI | 19.8N | 72.2W | 1446 | 03/21 |
| JACAMEL | HAITI | 18.1N | 72.5W | 1450 | 03/21 |
| WEST CAICOS | TURKS N CAICOS | 21.7N | 72.5W | 1451 | 03/21 |
| CIENFUEGOS | CUBA | 22.0N | 80.5W | 1451 | 03/21 |
| GIBARA | CUBA | 21.1N | 76.1W | 1454 | 03/21 |
| MAYAGUANA | BAHAMAS | 22.3N | 73.0W | 1455 | 03/21 |
| PUERTO PLATA | DOMINICAN REP | 19.8N | 70.7W | 1457 | 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1504 | 03/21 |
| GRAND TURK | TURKS N CAICOS | 21.5N | 71.1W | 1506 | 03/21 |
| LONG ISLAND | BAHAMAS | 23.3N | 75.1W | 1514 | 03/21 |
| SAN SALVADOR | BAHAMAS | 24.1N | 74.5W | 1515 | 03/21 |
| EXUMA | BAHAMAS | 23.6N | 75.9W | 1525 | 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1527 | 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1528 | 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N | 74.1W | 1529 | 03/21 |
| CAT ISLAND | BAHAMAS | 24.4N | 75.5W | 1533 | 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N | 67.2W | 1535 | 03/21 |
| SAN JUAN | PUERTO RICO | 18.5N | 66.1W | 1537 | 03/21 |
| CABO ENGANO | DOMINICAN REP | 18.6N | 68.3W | 1537 | 03/21 |
| ELEUTHERA ISLAN | BAHAMAS | 25.2N | 76.1W | 1541 | 03/21 |
| COZUMEL | MEXICO | 20.5N | 87.0W | 1543 | 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1546 | 03/21 |
| PUERTO CORTES | HONDURAS | 15.9N | 88.0W | 1547 | 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1547 | 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1550 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1553 | 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1553 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1556 | 03/21 |
| CHRISTIANSTED | US VIRGIN IS | 17.7N | 64.7W | 1559 | 03/21 |
| ANEGADA | BR VIRGIN IS | 18.8N | 64.3W | 1601 | 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1602 | 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1602 | 03/21 |
| LA HABANA | CUBA | 23.2N | 82.4W | 1607 | 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1608 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1608 | 03/21 |
| SABA | SABA | 17.6N | 63.2W | 1610 | 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1614 | 03/21 |
| SIMPSON BAAI | SINT MAARTEN | 18.0N | 63.1W | 1616 | 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1617 | 03/21 |
| THE VALLEY | ANGUILLA | 18.3N | 63.1W | 1617 | 03/21 |
| SINT EUSTATIUS | SINT EUSTATIUS | 17.5N | 63.0W | 1618 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1619 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1619 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1622 | 03/21 |
| CHARLOTTE AMALI | US VIRGIN IS | 18.3N | 64.9W | 1624 | 03/21 |
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1625 | 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1625 | 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1627 | 03/21 |
| PLYMOUTH | MONTSERRAT | 16.7N | 62.2W | 1629 | 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1629 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1629 | 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1632 | 03/21 |
| TRUJILLO | HONDURAS | 15.9N | 86.0W | 1633 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1634 | 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1634 | 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1637 | 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1638 | 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1638 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1639 | 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1640 | 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1642 | 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1643 | 03/21 |
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1645 | 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1647 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1649 | 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1650 | 03/21 |
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1654 | 03/21 |
| BELIZE CITY | BELIZE | 17.5N | 88.2W | 1656 | 03/21 |

| | | | | | |
|-----------------|-----------------|-------|-------|------|-------|
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1700 | 03/21 |
| SAINT GEORGES | GRENADA | 12.0N | 61.8W | 1703 | 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1703 | 03/21 |
| SANTA CRZ D SUR | CUBA | 20.7N | 78.0W | 1715 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1722 | 03/21 |
| PUERTO BARRIOS | GUATEMALA | 15.7N | 88.6W | 1739 | 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1745 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1809 | 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1817 | 03/21 |
| NUEVA GERONA | CUBA | 21.9N | 82.8W | 1853 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1908 | 03/21 |
| PROGRESO | MEXICO | 21.3N | 89.7W | 1928 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 2024 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2036 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|-----------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LON | | | |
| PORT ROYAL JM | 17.9N | 76.8W | 1517 | 5.23M/17.2FT | 14 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1512 | 1.12M/ 3.7FT | 20 |

| | | | | | | |
|----------------|-------|-------|------|--------|-------|----|
| JACMEL HT | 18.2N | 72.5W | 1457 | 2.20M/ | 7.2FT | 24 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1456 | 2.86M/ | 9.4FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1447 | 2.55M/ | 8.4FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$
NNNN

PTWC Message #4

ZCZC

WECA41 PHEB 211625

TSUCAX

TSUNAMI MESSAGE NUMBER 4

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1625 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COLOMBIA... CUBA... HAITI... PANAMA... BAHAMAS... CAYMAN ISLANDS... AND JAMAICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

BELIZE... COSTA RICA... DOMINICAN REPUBLIC... GUATEMALA... HONDURAS... MEXICO... NICARAGUA... VENEZUELA... ARUBA... BONAIRE... CURACAO... DOMINICA... GRENADA... GUADELOUPE... MARTINIQUE... MONTSERRAT... PUERTO RICO AND VIRGIN ISLANDS... SAINT KITTS AND NEVIS... SAINT LUCIA... SAINT VINCENT AND THE GRENADINES... SAN ANDRES AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANGUILLA... ANTIGUA AND BARBUDA... BARBADOS... SABA AND SAINT EUSTATIUS... SAINT BARTHELEMY... SINT MAARTEN... SAINT MARTIN... AND TRINIDAD AND TOBAGO.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) | |
|-----------------|------------------|-------------|-------|----------|-------|
| EXUMA | BAHAMAS | 23.6N | 75.9W | 1525 | 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1527 | 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1528 | 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N | 74.1W | 1529 | 03/21 |
| CAT ISLAND | BAHAMAS | 24.4N | 75.5W | 1533 | 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N | 67.2W | 1535 | 03/21 |
| SAN JUAN | PUERTO RICO | 18.5N | 66.1W | 1537 | 03/21 |
| CABO ENGANO | DOMINICAN REP | 18.6N | 68.3W | 1537 | 03/21 |
| ELEUTHERA ISLAN | BAHAMAS | 25.2N | 76.1W | 1541 | 03/21 |
| COZUMEL | MEXICO | 20.5N | 87.0W | 1543 | 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1546 | 03/21 |
| PUERTO CORTES | HONDURAS | 15.9N | 88.0W | 1547 | 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1547 | 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1550 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1553 | 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1553 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1556 | 03/21 |
| CHRISTIANSTED | US VIRGIN IS | 17.7N | 64.7W | 1559 | 03/21 |
| ANEGADA | BR VIRGIN IS | 18.8N | 64.3W | 1601 | 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1602 | 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1602 | 03/21 |
| LA HABANA | CUBA | 23.2N | 82.4W | 1607 | 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1608 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1608 | 03/21 |
| SABA | SABA | 17.6N | 63.2W | 1610 | 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1614 | 03/21 |
| SIMPSON BAAI | SINT MAARTEN | 18.0N | 63.1W | 1616 | 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1617 | 03/21 |
| THE VALLEY | ANGUILLA | 18.3N | 63.1W | 1617 | 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| SINT EUSTATIUS | SINT EUSTATIUS | 17.5N | 63.0W | 1618 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1619 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1619 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1622 | 03/21 |
| CHARLOTTE AMALI | US VIRGIN IS | 18.3N | 64.9W | 1624 | 03/21 |
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1625 | 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1625 | 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1627 | 03/21 |
| PLYMOUTH | MONTSERRAT | 16.7N | 62.2W | 1629 | 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1629 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1629 | 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1632 | 03/21 |
| TRUJILLO | HONDURAS | 15.9N | 86.0W | 1633 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1634 | 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1634 | 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1637 | 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1638 | 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1638 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1639 | 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1640 | 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1642 | 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1643 | 03/21 |
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1645 | 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1647 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1649 | 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1650 | 03/21 |
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1654 | 03/21 |
| BELIZE CITY | BELIZE | 17.5N | 88.2W | 1656 | 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1700 | 03/21 |
| SAINT GEORGES | GRENADA | 12.0N | 61.8W | 1703 | 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1703 | 03/21 |
| SANTA CRZ D SUR | CUBA | 20.7N | 78.0W | 1715 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1722 | 03/21 |
| PUERTO BARRIOS | GUATEMALA | 15.7N | 88.6W | 1739 | 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1745 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1809 | 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1817 | 03/21 |
| NUEVA GERONA | CUBA | 21.9N | 82.8W | 1853 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1908 | 03/21 |
| PROGRESO | MEXICO | 21.3N | 89.7W | 1928 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 2024 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2036 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LOE | | | |
| EL PORVENIR PA | 9.6N | 78.9W | 1623 | 2.36M/ 7.7FT | 22 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1614 | 1.05M/ 3.5FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1614 | 1.37M/ 4.5FT | 22 |
| SAN ANDRES CO | 12.6N | 81.7W | 1610 | 1.84M/ 6.0FT | 18 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1614 | 1.07M/ 3.5FT | 28 |
| LIMETREE VI | 17.7N | 64.8W | 1613 | 1.16M/ 3.8FT | 24 |
| ST CROIX VI | 17.7N | 64.7W | 1605 | 0.55M/ 1.8FT | 14 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1611 | 1.04M/ 3.4FT | 26 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1605 | 1.16M/ 3.8FT | 28 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1602 | 2.93M/ 9.6FT | 28 |
| YABUCOA PR | 18.1N | 65.8W | 1559 | 0.84M/ 2.8FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1600 | 1.54M/ 5.1FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1600 | 1.21M/ 4.0FT | 28 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1606 | 1.86M/ 6.1FT | 22 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1601 | 1.16M/ 3.8FT | 28 |

| | | | | | | |
|-------------------|-------|-------|------|--------|--------|----|
| PUERTO CORTES HN | 15.8N | 88.0W | 1555 | 1.56M/ | 5.1FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1556 | 3.02M/ | 9.9FT | 18 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1546 | 1.74M/ | 5.7FT | 20 |
| PUNTA CANA DO | 18.5N | 68.4W | 1543 | 0.90M/ | 3.0FT | 24 |
| SAN JUAN PR | 18.5N | 66.1W | 1549 | 0.21M/ | 0.7FT | 26 |
| AGUADILLA PR | 18.5N | 67.2W | 1544 | 0.58M/ | 1.9FT | 18 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1547 | 1.25M/ | 4.1FT | 26 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1540 | 0.85M/ | 2.8FT | 26 |
| ARECIBO PR | 18.5N | 66.7W | 1549 | 0.33M/ | 1.1FT | 26 |
| MONA ISLAND PR | 18.1N | 67.9W | 1546 | 1.00M/ | 3.3FT | 20 |
| DART 42407 | 15.3N | 68.2W | 1546 | 0.12M/ | 0.4FT | 22 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1539 | 5.37M/ | 17.6FT | 22 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1532 | 1.51M/ | 5.0FT | 16 |
| BARAHONA DO | 18.2N | 71.1W | 1530 | 1.51M/ | 5.0FT | 24 |
| PORT ROYAL JM | 17.9N | 76.8W | 1517 | 5.23M/ | 17.2FT | 14 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1512 | 1.12M/ | 3.7FT | 20 |
| JACMEL HT | 18.2N | 72.5W | 1457 | 2.20M/ | 7.2FT | 24 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1456 | 2.86M/ | 9.4FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1447 | 2.55M/ | 8.4FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$
NNNN

PTWC Message #5

ZCZC

WECA41 PHEB 211725

TSUCAX

TSUNAMI MESSAGE NUMBER 5

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1725 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COLOMBIA... CUBA... HAITI... PANAMA... BAHAMAS... CAYMAN ISLANDS... AND JAMAICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

BELIZE... COSTA RICA... DOMINICAN REPUBLIC... GUATEMALA... HONDURAS... MEXICO... NICARAGUA... VENEZUELA... ARUBA... BONAIRE... CURACAO... DOMINICA... GRENADA... GUADELOUPE... MARTINIQUE... MONTSERRAT... PUERTO RICO AND VIRGIN ISLANDS... SAINT KITTS AND NEVIS... SAINT LUCIA... SAINT VINCENT AND THE GRENADINES... SAN ANDRES AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANGUILLA... ANTIGUA AND BARBUDA... BARBADOS... SABA AND SAINT EUSTATIUS... SAINT BARTHELEMY... SINT MAARTEN... SAINT MARTIN... AND TRINIDAD AND TOBAGO.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|------------------|-------------|-------|------------|
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1625 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1625 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1627 03/21 |
| PLYMOUTH | MONTSERRAT | 16.7N | 62.2W | 1629 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1629 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1629 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1632 03/21 |
| TRUJILLO | HONDURAS | 15.9N | 86.0W | 1633 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1634 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1634 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1637 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1638 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1638 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1639 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1640 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1642 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1643 03/21 |
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1645 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1647 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1649 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1650 03/21 |
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1654 03/21 |
| BELIZE CITY | BELIZE | 17.5N | 88.2W | 1656 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1700 03/21 |
| SAINT GEORGES | GRENADA | 12.0N | 61.8W | 1703 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1703 03/21 |
| SANTA CRZ D SUR | CUBA | 20.7N | 78.0W | 1715 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1722 03/21 |
| PUERTO BARRIOS | GUATEMALA | 15.7N | 88.6W | 1739 03/21 |

| | | | | | |
|-----------------|-----------------|-------|-------|------|-------|
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1745 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1809 | 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1817 | 03/21 |
| NUEVA GERONA | CUBA | 21.9N | 82.8W | 1853 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1908 | 03/21 |
| PROGRESO | MEXICO | 21.3N | 89.7W | 1928 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 2024 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2036 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|--------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LON | | | |
| BRIDGEPORT BB | 13.1N | 59.6W | 1717 | 0.47M/ 1.5FT | 20 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1712 | 0.81M/ 2.7FT | 18 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1712 | 0.45M/ 1.5FT | 18 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1705 | 0.04M/ 0.1FT | 24 |
| CALLIAQUA VC | 13.1N | 61.2W | 1701 | 1.36M/ 4.5FT | 18 |

| | | | | | | |
|---------------------|-------|-------|------|--------|--------|----|
| TELA HN | 15.8N | 87.5W | 1704 | 1.03M/ | 3.4FT | 28 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1659 | 1.89M/ | 6.2FT | 18 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1703 | 0.50M/ | 1.6FT | 20 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1702 | 1.13M/ | 3.7FT | 22 |
| BARBUDA AG | 17.6N | 61.8W | 1658 | 0.20M/ | 0.7FT | 26 |
| BERMUDA UK | 32.4N | 64.7W | 1651 | 0.26M/ | 0.8FT | 22 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1646 | 0.91M/ | 3.0FT | 24 |
| POINT A PITRE GP | 16.2N | 61.5W | 1648 | 0.48M/ | 1.6FT | 28 |
| ROSEAU DM | 15.3N | 61.4W | 1653 | 0.96M/ | 3.1FT | 18 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1644 | 0.61M/ | 2.0FT | 14 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1640 | 0.82M/ | 2.7FT | 18 |
| SAINTE MARTIN FR | 18.1N | 63.1W | 1639 | 0.67M/ | 2.2FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1641 | 2.45M/ | 8.1FT | 26 |
| BASSETERRE KN | 17.3N | 62.7W | 1638 | 0.50M/ | 1.6FT | 22 |
| PARHAM AT | 17.1N | 61.8W | 1634 | 0.27M/ | 0.9FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1634 | 0.45M/ | 1.5FT | 26 |
| COVENAS CO | 9.4N | 76.2W | 1630 | 2.39M/ | 7.9FT | 16 |
| EL PORVENIR PA | 9.6N | 78.9W | 1623 | 2.36M/ | 7.7FT | 22 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1614 | 1.05M/ | 3.5FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1614 | 1.37M/ | 4.5FT | 22 |
| SAN ANDRES CO | 12.6N | 81.7W | 1610 | 1.84M/ | 6.0FT | 18 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1614 | 1.07M/ | 3.5FT | 28 |
| LIMETREE VI | 17.7N | 64.8W | 1613 | 1.16M/ | 3.8FT | 24 |
| ST CROIX VI | 17.7N | 64.7W | 1605 | 0.55M/ | 1.8FT | 14 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1611 | 1.04M/ | 3.4FT | 26 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1605 | 1.16M/ | 3.8FT | 28 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1602 | 2.93M/ | 9.6FT | 28 |
| YABUcoa PR | 18.1N | 65.8W | 1559 | 0.84M/ | 2.8FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1600 | 1.54M/ | 5.1FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1600 | 1.21M/ | 4.0FT | 28 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1606 | 1.86M/ | 6.1FT | 22 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1601 | 1.16M/ | 3.8FT | 28 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1555 | 1.56M/ | 5.1FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1556 | 3.02M/ | 9.9FT | 18 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1546 | 1.74M/ | 5.7FT | 20 |
| PUNTA CANA DO | 18.5N | 68.4W | 1543 | 0.90M/ | 3.0FT | 24 |
| SAN JUAN PR | 18.5N | 66.1W | 1549 | 0.21M/ | 0.7FT | 26 |
| AGUADILLA PR | 18.5N | 67.2W | 1544 | 0.58M/ | 1.9FT | 18 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1547 | 1.25M/ | 4.1FT | 26 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1540 | 0.85M/ | 2.8FT | 26 |
| ARECIBO PR | 18.5N | 66.7W | 1549 | 0.33M/ | 1.1FT | 26 |
| MONA ISLAND PR | 18.1N | 67.9W | 1546 | 1.00M/ | 3.3FT | 20 |
| DART 42407 | 15.3N | 68.2W | 1546 | 0.12M/ | 0.4FT | 22 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1539 | 5.37M/ | 17.6FT | 22 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1532 | 1.51M/ | 5.0FT | 16 |

| | | | | | |
|-----------------|-------|-------|------|--------------|----|
| BARAHONA DO | 18.2N | 71.1W | 1530 | 1.51M/ 5.0FT | 24 |
| PORT ROYAL JM | 17.9N | 76.8W | 1517 | 5.23M/17.2FT | 14 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1512 | 1.12M/ 3.7FT | 20 |
| JACMEL HT | 18.2N | 72.5W | 1457 | 2.20M/ 7.2FT | 24 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1456 | 2.86M/ 9.4FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1447 | 2.55M/ 8.4FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$
NNNN

PTWC Message #6

ZCZC

WECA41 PHEB 211825

TSUCAX

TSUNAMI MESSAGE NUMBER 6

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1825 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COLOMBIA... CUBA... HAITI... PANAMA... BAHAMAS... CAYMAN ISLANDS... AND JAMAICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

BELIZE... COSTA RICA... DOMINICAN REPUBLIC... GUATEMALA... HONDURAS... MEXICO... NICARAGUA... VENEZUELA... ARUBA... BONAIRE... CURACAO... DOMINICA... GRENADA... GUADELOUPE... MARTINIQUE... MONTSERRAT... PUERTO RICO AND VIRGIN ISLANDS... SAINT KITTS AND NEVIS... SAINT LUCIA... SAINT VINCENT AND THE GRENADINES... SAN ANDRES AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANGUILLA... ANTIGUA AND BARBUDA... BARBADOS... SABA AND SAINT EUSTATIUS... SAINT BARTHELEMY... SINT MAARTEN... SAINT MARTIN... AND TRINIDAD AND TOBAGO.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|-----------------|-------------|-------|------------|
| PUERTO BARRIOS | GUATEMALA | 15.7N | 88.6W | 1739 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1745 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1809 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1817 03/21 |
| NUEVA GERONA | CUBA | 21.9N | 82.8W | 1853 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1908 03/21 |
| PROGRESO | MEXICO | 21.3N | 89.7W | 1928 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 2024 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2036 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

* THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LON | | | |
| TRIDENT PIER FL | 28.4N | 80.6W | 1819 | 0.10M/ 0.3FT | 28 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1800 | 0.38M/ 1.2FT | 24 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1750 | 0.24M/ 0.8FT | 20 |
| PILOTS STATION LA | 28.9N | 89.4W | 1734 | 0.17M/ 0.6FT | 26 |
| VACA KEY FL | 24.7N | 81.1W | 1728 | 0.21M/ 0.7FT | 20 |
| TORTOLA VI UK | 18.4N | 64.6W | 1736 | 0.64M/ 2.1FT | 16 |
| KEY WEST FL | 24.6N | 81.8W | 1729 | 0.21M/ 0.7FT | 20 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1717 | 0.47M/ 1.5FT | 20 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1712 | 0.81M/ 2.7FT | 18 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1712 | 0.45M/ 1.5FT | 18 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1705 | 0.04M/ 0.1FT | 24 |
| CALLIAQUA VC | 13.1N | 61.2W | 1701 | 1.36M/ 4.5FT | 18 |
| TELA HN | 15.8N | 87.5W | 1704 | 1.03M/ 3.4FT | 28 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1659 | 1.89M/ 6.2FT | 18 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1703 | 0.50M/ 1.6FT | 20 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1702 | 1.13M/ 3.7FT | 22 |
| BARBUDA AG | 17.6N | 61.8W | 1658 | 0.20M/ 0.7FT | 26 |
| BERMUDA UK | 32.4N | 64.7W | 1651 | 0.26M/ 0.8FT | 22 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1646 | 0.91M/ 3.0FT | 24 |
| POINT A PITRE GP | 16.2N | 61.5W | 1648 | 0.48M/ 1.6FT | 28 |
| ROSEAU DM | 15.3N | 61.4W | 1653 | 0.96M/ 3.1FT | 18 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1644 | 0.61M/ 2.0FT | 14 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1640 | 0.82M/ 2.7FT | 18 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1639 | 0.67M/ 2.2FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1641 | 2.45M/ 8.1FT | 26 |
| BASSETERRE KN | 17.3N | 62.7W | 1638 | 0.50M/ 1.6FT | 22 |
| PARHAM AT | 17.1N | 61.8W | 1634 | 0.27M/ 0.9FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1634 | 0.45M/ 1.5FT | 26 |
| COVENAS CO | 9.4N | 76.2W | 1630 | 2.39M/ 7.9FT | 16 |
| EL PORVENIR PA | 9.6N | 78.9W | 1623 | 2.36M/ 7.7FT | 22 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1614 | 1.05M/ 3.5FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1614 | 1.37M/ 4.5FT | 22 |
| SAN ANDRES CO | 12.6N | 81.7W | 1610 | 1.84M/ 6.0FT | 18 |

| | | | | | | |
|---------------------|-------|-------|------|--------|--------|----|
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1614 | 1.07M/ | 3.5FT | 28 |
| LIMETREE VI | 17.7N | 64.8W | 1613 | 1.16M/ | 3.8FT | 24 |
| ST CROIX VI | 17.7N | 64.7W | 1605 | 0.55M/ | 1.8FT | 14 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1611 | 1.04M/ | 3.4FT | 26 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1605 | 1.16M/ | 3.8FT | 28 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1602 | 2.93M/ | 9.6FT | 28 |
| YABUCOA PR | 18.1N | 65.8W | 1559 | 0.84M/ | 2.8FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1600 | 1.54M/ | 5.1FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1600 | 1.21M/ | 4.0FT | 28 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1606 | 1.86M/ | 6.1FT | 22 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1601 | 1.16M/ | 3.8FT | 28 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1555 | 1.56M/ | 5.1FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1556 | 3.02M/ | 9.9FT | 18 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1546 | 1.74M/ | 5.7FT | 20 |
| PUNTA CANA DO | 18.5N | 68.4W | 1543 | 0.90M/ | 3.0FT | 24 |
| SAN JUAN PR | 18.5N | 66.1W | 1549 | 0.21M/ | 0.7FT | 26 |
| AGUADILLA PR | 18.5N | 67.2W | 1544 | 0.58M/ | 1.9FT | 18 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1547 | 1.25M/ | 4.1FT | 26 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1540 | 0.85M/ | 2.8FT | 26 |
| ARECIBO PR | 18.5N | 66.7W | 1549 | 0.33M/ | 1.1FT | 26 |
| MONA ISLAND PR | 18.1N | 67.9W | 1546 | 1.00M/ | 3.3FT | 20 |
| DART 42407 | 15.3N | 68.2W | 1546 | 0.12M/ | 0.4FT | 22 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1539 | 5.37M/ | 17.6FT | 22 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1532 | 1.51M/ | 5.0FT | 16 |
| BARAHONA DO | 18.2N | 71.1W | 1530 | 1.51M/ | 5.0FT | 24 |
| PORT ROYAL JM | 17.9N | 76.8W | 1517 | 5.23M/ | 17.2FT | 14 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1512 | 1.12M/ | 3.7FT | 20 |
| JACMEL HT | 18.2N | 72.5W | 1457 | 2.20M/ | 7.2FT | 24 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1456 | 2.86M/ | 9.4FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1447 | 2.55M/ | 8.4FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.

* COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

* COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

PTWC Message #7

ZCZC

WECA41 PHEB 211925

TSUCAX

TSUNAMI MESSAGE NUMBER 7

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1925 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COLOMBIA... CUBA... HAITI... PANAMA... BAHAMAS... CAYMAN ISLANDS... AND JAMAICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

BELIZE... COSTA RICA... DOMINICAN REPUBLIC... GUATEMALA... HONDURAS... MEXICO... NICARAGUA... VENEZUELA... ARUBA... BONAIRE... CURACAO... DOMINICA... GRENADA... GUADELOUPE... MARTINIQUE... MONTSERRAT... PUERTO RICO AND VIRGIN ISLANDS... SAINT KITTS AND NEVIS... SAINT LUCIA... SAINT VINCENT AND THE GRENADINES... SAN ANDRES AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANGUILLA... ANTIGUA AND BARBUDA... BARBADOS... SABA AND SAINT EUSTATIUS... SAINT BARTHELEMY... SINT MAARTEN... SAINT MARTIN... AND TRINIDAD AND TOBAGO.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|-----------|-------------|-------|------------|
| NUEVA GERONA | CUBA | 21.9N | 82.8W | 1853 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1908 03/21 |
| PROGRESO | MEXICO | 21.3N | 89.7W | 1928 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 2024 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2036 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED

LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH
RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------|-------------------|
| | LAT | LON | | | | |
| DAUPHIN ISLAND AL | 30.3N | 88.1W | 1858 | 0.06M/ | 0.2FT | 26 |
| WRIGHT BEACH NC | 34.2N | 77.8W | 1850 | 0.36M/ | 1.2FT | 28 |
| GRAND ISLE LA | 29.3N | 90.0W | 1832 | 0.11M/ | 0.4FT | 26 |
| PORT OF SPAIN TT | 10.6N | 61.5W | 1831 | 0.26M/ | 0.9FT | 22 |
| TRIDENT PIER FL | 28.4N | 80.6W | 1819 | 0.10M/ | 0.3FT | 28 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1800 | 0.38M/ | 1.2FT | 24 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1750 | 0.24M/ | 0.8FT | 20 |
| PILOTS STATION LA | 28.9N | 89.4W | 1734 | 0.17M/ | 0.6FT | 26 |
| VACA KEY FL | 24.7N | 81.1W | 1728 | 0.21M/ | 0.7FT | 20 |
| TORTOLA VI UK | 18.4N | 64.6W | 1736 | 0.64M/ | 2.1FT | 16 |
| KEY WEST FL | 24.6N | 81.8W | 1729 | 0.21M/ | 0.7FT | 20 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1717 | 0.47M/ | 1.5FT | 20 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1712 | 0.81M/ | 2.7FT | 18 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1712 | 0.45M/ | 1.5FT | 18 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1705 | 0.04M/ | 0.1FT | 24 |
| CALLIAQUA VC | 13.1N | 61.2W | 1701 | 1.36M/ | 4.5FT | 18 |
| TELA HN | 15.8N | 87.5W | 1704 | 1.03M/ | 3.4FT | 28 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1659 | 1.89M/ | 6.2FT | 18 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1703 | 0.50M/ | 1.6FT | 20 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1702 | 1.13M/ | 3.7FT | 22 |
| BARBUDA AG | 17.6N | 61.8W | 1658 | 0.20M/ | 0.7FT | 26 |
| BERMUDA UK | 32.4N | 64.7W | 1651 | 0.26M/ | 0.8FT | 22 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1646 | 0.91M/ | 3.0FT | 24 |
| POINT A PITRE GP | 16.2N | 61.5W | 1648 | 0.48M/ | 1.6FT | 28 |
| ROSEAU DM | 15.3N | 61.4W | 1653 | 0.96M/ | 3.1FT | 18 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1644 | 0.61M/ | 2.0FT | 14 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1640 | 0.82M/ | 2.7FT | 18 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1639 | 0.67M/ | 2.2FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1641 | 2.45M/ | 8.1FT | 26 |
| BASSETERRE KN | 17.3N | 62.7W | 1638 | 0.50M/ | 1.6FT | 22 |
| PARHAM AT | 17.1N | 61.8W | 1634 | 0.27M/ | 0.9FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1634 | 0.45M/ | 1.5FT | 26 |
| COVENAS CO | 9.4N | 76.2W | 1630 | 2.39M/ | 7.9FT | 16 |
| EL PORVENIR PA | 9.6N | 78.9W | 1623 | 2.36M/ | 7.7FT | 22 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1614 | 1.05M/ | 3.5FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1614 | 1.37M/ | 4.5FT | 22 |
| SAN ANDRES CO | 12.6N | 81.7W | 1610 | 1.84M/ | 6.0FT | 18 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1614 | 1.07M/ | 3.5FT | 28 |

| | | | | | | |
|--------------------|-------|-------|------|--------|--------|----|
| LIMETREE VI | 17.7N | 64.8W | 1613 | 1.16M/ | 3.8FT | 24 |
| ST CROIX VI | 17.7N | 64.7W | 1605 | 0.55M/ | 1.8FT | 14 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1611 | 1.04M/ | 3.4FT | 26 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1605 | 1.16M/ | 3.8FT | 28 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1602 | 2.93M/ | 9.6FT | 28 |
| YABUCOA PR | 18.1N | 65.8W | 1559 | 0.84M/ | 2.8FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1600 | 1.54M/ | 5.1FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1600 | 1.21M/ | 4.0FT | 28 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1606 | 1.86M/ | 6.1FT | 22 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1601 | 1.16M/ | 3.8FT | 28 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1555 | 1.56M/ | 5.1FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1556 | 3.02M/ | 9.9FT | 18 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1546 | 1.74M/ | 5.7FT | 20 |
| PUNTA CANA DO | 18.5N | 68.4W | 1543 | 0.90M/ | 3.0FT | 24 |
| SAN JUAN PR | 18.5N | 66.1W | 1549 | 0.21M/ | 0.7FT | 26 |
| AGUADILLA PR | 18.5N | 67.2W | 1544 | 0.58M/ | 1.9FT | 18 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1547 | 1.25M/ | 4.1FT | 26 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1540 | 0.85M/ | 2.8FT | 26 |
| ARECIBO PR | 18.5N | 66.7W | 1549 | 0.33M/ | 1.1FT | 26 |
| MONA ISLAND PR | 18.1N | 67.9W | 1546 | 1.00M/ | 3.3FT | 20 |
| DART 42407 | 15.3N | 68.2W | 1546 | 0.12M/ | 0.4FT | 22 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1539 | 5.37M/ | 17.6FT | 22 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1532 | 1.51M/ | 5.0FT | 16 |
| BARAHONA DO | 18.2N | 71.1W | 1530 | 1.51M/ | 5.0FT | 24 |
| PORT ROYAL JM | 17.9N | 76.8W | 1517 | 5.23M/ | 17.2FT | 14 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1512 | 1.12M/ | 3.7FT | 20 |
| JACMEL HT | 18.2N | 72.5W | 1457 | 2.20M/ | 7.2FT | 24 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1456 | 2.86M/ | 9.4FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1447 | 2.55M/ | 8.4FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS...

AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC
TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE
PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

* COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND
THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S.
NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND
AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

PTWC Message #8

ZCZC

WECA41 PHEB 212025

TSUCAX

TSUNAMI MESSAGE NUMBER 8

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

2025 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

COLOMBIA... CUBA... HAITI... PANAMA... BAHAMAS... CAYMAN ISLANDS... AND JAMAICA.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

BELIZE... COSTA RICA... DOMINICAN REPUBLIC... GUATEMALA... HONDURAS... MEXICO... NICARAGUA... VENEZUELA... ARUBA... BONAIRE... CURACAO... DOMINICA... GRENADA... GUADELOUPE... MARTINIQUE... MONTSERRAT... PUERTO RICO AND VIRGIN ISLANDS... SAINT KITTS AND NEVIS... SAINT LUCIA... SAINT VINCENT AND THE GRENADINES... SAN ANDRES AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

ANGUILLA... ANTIGUA AND BARBUDA... BARBADOS... SABA AND SAINT EUSTATIUS... SAINT BARTHELEMY... SINT MAARTEN... SAINT MARTIN... AND TRINIDAD AND TOBAGO.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|----------------|-----------|-------------|-------|------------|
| PROGRESO | MEXICO | 21.3N | 89.7W | 1928 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 2024 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2036 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------|-------------------|
| | LAT | Lon | | | | |
| TELCHAC MX | 21.3N | 89.3W | 1943 | 0.04M/ | 0.1FT | 28 |
| DAUPHIN ISLAND AL | 30.3N | 88.1W | 1858 | 0.06M/ | 0.2FT | 26 |
| WRIGHT BEACH NC | 34.2N | 77.8W | 1850 | 0.36M/ | 1.2FT | 28 |
| GRAND ISLE LA | 29.3N | 90.0W | 1832 | 0.11M/ | 0.4FT | 26 |
| PORT OF SPAIN TT | 10.6N | 61.5W | 1831 | 0.26M/ | 0.9FT | 22 |
| TRIDENT PIER FL | 28.4N | 80.6W | 1819 | 0.10M/ | 0.3FT | 28 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1800 | 0.38M/ | 1.2FT | 24 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1750 | 0.24M/ | 0.8FT | 20 |
| PILOTS STATION LA | 28.9N | 89.4W | 1734 | 0.17M/ | 0.6FT | 26 |
| VACA KEY FL | 24.7N | 81.1W | 1728 | 0.21M/ | 0.7FT | 20 |
| TORTOLA VI UK | 18.4N | 64.6W | 1736 | 0.64M/ | 2.1FT | 16 |
| KEY WEST FL | 24.6N | 81.8W | 1729 | 0.21M/ | 0.7FT | 20 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1717 | 0.47M/ | 1.5FT | 20 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1712 | 0.81M/ | 2.7FT | 18 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1712 | 0.45M/ | 1.5FT | 18 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1705 | 0.04M/ | 0.1FT | 24 |
| CALLIAQUA VC | 13.1N | 61.2W | 1701 | 1.36M/ | 4.5FT | 18 |
| TELA HN | 15.8N | 87.5W | 1704 | 1.03M/ | 3.4FT | 28 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1659 | 1.89M/ | 6.2FT | 18 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1703 | 0.50M/ | 1.6FT | 20 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1702 | 1.13M/ | 3.7FT | 22 |
| BARBUDA AG | 17.6N | 61.8W | 1658 | 0.20M/ | 0.7FT | 26 |
| BERMUDA UK | 32.4N | 64.7W | 1651 | 0.26M/ | 0.8FT | 22 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1646 | 0.91M/ | 3.0FT | 24 |
| POINT A PITRE GP | 16.2N | 61.5W | 1648 | 0.48M/ | 1.6FT | 28 |
| ROSEAU DM | 15.3N | 61.4W | 1653 | 0.96M/ | 3.1FT | 18 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1644 | 0.61M/ | 2.0FT | 14 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1640 | 0.82M/ | 2.7FT | 18 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1639 | 0.67M/ | 2.2FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1641 | 2.45M/ | 8.1FT | 26 |
| BASSETERRE KN | 17.3N | 62.7W | 1638 | 0.50M/ | 1.6FT | 22 |
| PARHAM AT | 17.1N | 61.8W | 1634 | 0.27M/ | 0.9FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1634 | 0.45M/ | 1.5FT | 26 |
| COVENAS CO | 9.4N | 76.2W | 1630 | 2.39M/ | 7.9FT | 16 |
| EL PORVENIR PA | 9.6N | 78.9W | 1623 | 2.36M/ | 7.7FT | 22 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1614 | 1.05M/ | 3.5FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1614 | 1.37M/ | 4.5FT | 22 |
| SAN ANDRES CO | 12.6N | 81.7W | 1610 | 1.84M/ | 6.0FT | 18 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1614 | 1.07M/ | 3.5FT | 28 |
| LIMETREE VI | 17.7N | 64.8W | 1613 | 1.16M/ | 3.8FT | 24 |
| ST CROIX VI | 17.7N | 64.7W | 1605 | 0.55M/ | 1.8FT | 14 |

| | | | | | | |
|--------------------|-------|-------|------|--------|--------|----|
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1611 | 1.04M/ | 3.4FT | 26 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1605 | 1.16M/ | 3.8FT | 28 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1602 | 2.93M/ | 9.6FT | 28 |
| YABUCOA PR | 18.1N | 65.8W | 1559 | 0.84M/ | 2.8FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1600 | 1.54M/ | 5.1FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1600 | 1.21M/ | 4.0FT | 28 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1606 | 1.86M/ | 6.1FT | 22 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1601 | 1.16M/ | 3.8FT | 28 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1555 | 1.56M/ | 5.1FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1556 | 3.02M/ | 9.9FT | 18 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1546 | 1.74M/ | 5.7FT | 20 |
| PUNTA CANA DO | 18.5N | 68.4W | 1543 | 0.90M/ | 3.0FT | 24 |
| SAN JUAN PR | 18.5N | 66.1W | 1549 | 0.21M/ | 0.7FT | 26 |
| AGUADILLA PR | 18.5N | 67.2W | 1544 | 0.58M/ | 1.9FT | 18 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1547 | 1.25M/ | 4.1FT | 26 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1540 | 0.85M/ | 2.8FT | 26 |
| ARECIBO PR | 18.5N | 66.7W | 1549 | 0.33M/ | 1.1FT | 26 |
| MONA ISLAND PR | 18.1N | 67.9W | 1546 | 1.00M/ | 3.3FT | 20 |
| DART 42407 | 15.3N | 68.2W | 1546 | 0.12M/ | 0.4FT | 22 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1539 | 5.37M/ | 17.6FT | 22 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1532 | 1.51M/ | 5.0FT | 16 |
| BARAHONA DO | 18.2N | 71.1W | 1530 | 1.51M/ | 5.0FT | 24 |
| PORT ROYAL JM | 17.9N | 76.8W | 1517 | 5.23M/ | 17.2FT | 14 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1512 | 1.12M/ | 3.7FT | 20 |
| JACMEL HT | 18.2N | 72.5W | 1457 | 2.20M/ | 7.2FT | 24 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1456 | 2.86M/ | 9.4FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1447 | 2.55M/ | 8.4FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE

PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

* COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND
THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S.
NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND
AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

PTWC Message #9

ZCZC

WECA41 PHEB 212125

TSUCAX

TSUNAMI MESSAGE NUMBER 9

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

2125 UTC TUE MAR 21 2017

...FINAL TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.2
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 19.6 NORTH 76.4 WEST
* DEPTH 20 KM / 12 MILES
* LOCATION CUBA REGION

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.2 OCCURRED IN THE CUBA REGION AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * BASED ON ALL AVAILABLE DATA... THE TSUNAMI THREAT FROM THIS EARTHQUAKE HAS PASSED AND THERE IS NO FURTHER THREAT.

TSUNAMI THREAT FORECAST...UPDATED

- * THE TSUNAMI THREAT HAS NOW LARGELY PASSED.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR ANY IMPACTED COASTAL AREAS SHOULD MONITOR CONDITIONS AT THE COAST TO DETERMINE IF AND WHEN IT IS SAFE TO RESUME NORMAL ACTIVITIES.
- * PERSONS LOCATED NEAR IMPACTED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM LOCAL AUTHORITIES.
- * REMAIN OBSERVANT AND EXERCISE NORMAL CAUTION NEAR THE SEA.

POTENTIAL IMPACTS

- * MINOR SEA LEVEL FLUCTUATIONS OF UP TO 1 FOOT ABOVE AND BELOW THE NORMAL TIDE MAY CONTINUE OVER THE NEXT FEW HOURS.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|-------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LON | | | |
| TELCHAC MX | 21.3N | 89.3W | 1943 | 0.04M/ 0.1FT | 28 |
| DAUPHIN ISLAND AL | 30.3N | 88.1W | 1858 | 0.06M/ 0.2FT | 26 |
| WRIGHT BEACH NC | 34.2N | 77.8W | 1850 | 0.36M/ 1.2FT | 28 |
| GRAND ISLE LA | 29.3N | 90.0W | 1832 | 0.11M/ 0.4FT | 26 |
| PORT OF SPAIN TT | 10.6N | 61.5W | 1831 | 0.26M/ 0.9FT | 22 |
| TRIDENT PIER FL | 28.4N | 80.6W | 1819 | 0.10M/ 0.3FT | 28 |

| | | | | | | |
|---------------------|-------|-------|------|--------|-------|----|
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1800 | 0.38M/ | 1.2FT | 24 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1750 | 0.24M/ | 0.8FT | 20 |
| PILOTS STATION LA | 28.9N | 89.4W | 1734 | 0.17M/ | 0.6FT | 26 |
| VACA KEY FL | 24.7N | 81.1W | 1728 | 0.21M/ | 0.7FT | 20 |
| TORTOLA VI UK | 18.4N | 64.6W | 1736 | 0.64M/ | 2.1FT | 16 |
| KEY WEST FL | 24.6N | 81.8W | 1729 | 0.21M/ | 0.7FT | 20 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1717 | 0.47M/ | 1.5FT | 20 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1712 | 0.81M/ | 2.7FT | 18 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1712 | 0.45M/ | 1.5FT | 18 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1705 | 0.04M/ | 0.1FT | 24 |
| CALLIAQUA VC | 13.1N | 61.2W | 1701 | 1.36M/ | 4.5FT | 18 |
| TELA HN | 15.8N | 87.5W | 1704 | 1.03M/ | 3.4FT | 28 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1659 | 1.89M/ | 6.2FT | 18 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1703 | 0.50M/ | 1.6FT | 20 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1702 | 1.13M/ | 3.7FT | 22 |
| BARBUDA AG | 17.6N | 61.8W | 1658 | 0.20M/ | 0.7FT | 26 |
| BERMUDA UK | 32.4N | 64.7W | 1651 | 0.26M/ | 0.8FT | 22 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1646 | 0.91M/ | 3.0FT | 24 |
| POINT A PITRE GP | 16.2N | 61.5W | 1648 | 0.48M/ | 1.6FT | 28 |
| ROSEAU DM | 15.3N | 61.4W | 1653 | 0.96M/ | 3.1FT | 18 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1644 | 0.61M/ | 2.0FT | 14 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1640 | 0.82M/ | 2.7FT | 18 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1639 | 0.67M/ | 2.2FT | 24 |
| SAPZURRO CO | 8.7N | 77.4W | 1641 | 2.45M/ | 8.1FT | 26 |
| BASSETERRE KN | 17.3N | 62.7W | 1638 | 0.50M/ | 1.6FT | 22 |
| PARHAM AT | 17.1N | 61.8W | 1634 | 0.27M/ | 0.9FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1634 | 0.45M/ | 1.5FT | 26 |
| COVENAS CO | 9.4N | 76.2W | 1630 | 2.39M/ | 7.9FT | 16 |
| EL PORVENIR PA | 9.6N | 78.9W | 1623 | 2.36M/ | 7.7FT | 22 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1614 | 1.05M/ | 3.5FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1614 | 1.37M/ | 4.5FT | 22 |
| SAN ANDRES CO | 12.6N | 81.7W | 1610 | 1.84M/ | 6.0FT | 18 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1614 | 1.07M/ | 3.5FT | 28 |
| LIMETREE VI | 17.7N | 64.8W | 1613 | 1.16M/ | 3.8FT | 24 |
| ST CROIX VI | 17.7N | 64.7W | 1605 | 0.55M/ | 1.8FT | 14 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1611 | 1.04M/ | 3.4FT | 26 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1605 | 1.16M/ | 3.8FT | 28 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1602 | 2.93M/ | 9.6FT | 28 |
| YABUCOA PR | 18.1N | 65.8W | 1559 | 0.84M/ | 2.8FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1600 | 1.54M/ | 5.1FT | 16 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1600 | 1.21M/ | 4.0FT | 28 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1606 | 1.86M/ | 6.1FT | 22 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1601 | 1.16M/ | 3.8FT | 28 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1555 | 1.56M/ | 5.1FT | 16 |
| SANTA MARTA CO | 11.2N | 74.2W | 1556 | 3.02M/ | 9.9FT | 18 |

| | | | | | | |
|-------------------|-------|-------|------|--------|--------|----|
| PUERTO MORELOS MX | 20.9N | 86.9W | 1546 | 1.74M/ | 5.7FT | 20 |
| PUNTA CANA DO | 18.5N | 68.4W | 1543 | 0.90M/ | 3.0FT | 24 |
| SAN JUAN PR | 18.5N | 66.1W | 1549 | 0.21M/ | 0.7FT | 26 |
| AGUADILLA PR | 18.5N | 67.2W | 1544 | 0.58M/ | 1.9FT | 18 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1547 | 1.25M/ | 4.1FT | 26 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1540 | 0.85M/ | 2.8FT | 26 |
| ARECIBO PR | 18.5N | 66.7W | 1549 | 0.33M/ | 1.1FT | 26 |
| MONA ISLAND PR | 18.1N | 67.9W | 1546 | 1.00M/ | 3.3FT | 20 |
| DART 42407 | 15.3N | 68.2W | 1546 | 0.12M/ | 0.4FT | 22 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1539 | 5.37M/ | 17.6FT | 22 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1532 | 1.51M/ | 5.0FT | 16 |
| BARAHONA DO | 18.2N | 71.1W | 1530 | 1.51M/ | 5.0FT | 24 |
| PORT ROYAL JM | 17.9N | 76.8W | 1517 | 5.23M/ | 17.2FT | 14 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1512 | 1.12M/ | 3.7FT | 20 |
| JACMEL HT | 18.2N | 72.5W | 1457 | 2.20M/ | 7.2FT | 24 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1456 | 2.86M/ | 9.4FT | 22 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1447 | 2.55M/ | 8.4FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THIS WILL BE THE FINAL STATEMENT ISSUED FOR THIS EVENT UNLESS NEW INFORMATION IS RECEIVED OR THE SITUATION CHANGES.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Northeastern Antilles Earthquake Scenario

The following messages created for the CARIBE WAVE 17 tsunami exercise are representative of the official standard products issued by the PTWC during a large magnitude 8.7 earthquake and tsunami originating in the Northeastern Antilles. During a real event, the TWCs would also issue graphical and html-based products to their web sites and via RSS. The alerts would persist longer during a real event than is depicted in this exercise.

PTWC Message #1

ZCZC

WECA41 PHEB 211405

TSUCAX

TSUNAMI MESSAGE NUMBER 1

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1405 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.3
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.3 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * BASED ON THE PRELIMINARY EARTHQUAKE PARAMETERS... WIDESPREAD HAZARDOUS TSUNAMI WAVES ARE POSSIBLE.

TSUNAMI THREAT FORECAST

- * HAZARDOUS TSUNAMI WAVES FROM THIS EARTHQUAKE ARE POSSIBLE WITHIN THE NEXT THREE HOURS ALONG SOME COASTS OF

MONTSERRAT... GUADELOUPE... DOMINICA... SAINT LUCIA...
MARTINIQUE... ANTIGUA... BARBUDA... SINT EUSTATIUS...
SAINT KITTS... SABA... BARBADOS... ANGUILLA... US VIRGIN
IS... SAINT VINCENT... BR VIRGIN IS... SINT MAARTEN...
PUERTO RICO... SAINT BARTHELEMY... SAINT MARTIN...
GRENADA... DOMINICAN REP... TURKS N CAICOS... TRINIDAD
TOBAGO... HAITI... BONAIRE... BAHAMAS... CUBA... ARUBA...
VENEZUELA... BERMUDA... CURACAO... CAYMAN ISLANDS...
COLOMBIA AND JAMAICA

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THE REGION IDENTIFIED WITH A POTENTIAL TSUNAMI THREAT. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-------------|------------|-------------|-------|------------|
| PLYMOUTH | MONTSERRAT | 16.7N | 62.2W | 1426 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1430 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1432 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1439 | 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1439 | 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1439 | 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1441 | 03/21 |
| SINT EUSTATIUS | SINT EUSTATIUS | 17.5N | 63.0W | 1443 | 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1443 | 03/21 |
| SABA | SABA | 17.6N | 63.2W | 1444 | 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1447 | 03/21 |
| THE VALLEY | ANGUILLA | 18.3N | 63.1W | 1449 | 03/21 |
| CHRISTIANSTED | US VIRGIN IS | 17.7N | 64.7W | 1451 | 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1453 | 03/21 |
| ANEGADA | BR VIRGIN IS | 18.8N | 64.3W | 1453 | 03/21 |
| SIMPSON BAAI | SINT MAARTEN | 18.0N | 63.1W | 1455 | 03/21 |
| SAN JUAN | PUERTO RICO | 18.5N | 66.1W | 1455 | 03/21 |
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1507 | 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N | 67.2W | 1508 | 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1513 | 03/21 |
| CHARLOTTE AMALI | US VIRGIN IS | 18.3N | 64.9W | 1513 | 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1515 | 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1518 | 03/21 |
| SAINT GEORGES | GRENADA | 12.0N | 61.8W | 1520 | 03/21 |
| CABO ENGANO | DOMINICAN REP | 18.6N | 68.3W | 1521 | 03/21 |
| PUERTO PLATA | DOMINICAN REP | 19.8N | 70.7W | 1523 | 03/21 |
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1529 | 03/21 |
| GRAND TURK | TURKS N CAICOS | 21.5N | 71.1W | 1531 | 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1532 | 03/21 |
| CAP HAITEN | HAITI | 19.8N | 72.2W | 1540 | 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1542 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1544 | 03/21 |
| MAYAGUANA | BAHAMAS | 22.3N | 73.0W | 1547 | 03/21 |
| WEST CAICOS | TURKS N CAICOS | 21.7N | 72.5W | 1548 | 03/21 |
| BARACOA | CUBA | 20.4N | 74.5W | 1559 | 03/21 |
| JACAMEL | HAITI | 18.1N | 72.5W | 1600 | 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N | 73.7W | 1601 | 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1601 | 03/21 |
| SAN SALVADOR | BAHAMAS | 24.1N | 74.5W | 1602 | 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1607 | 03/21 |
| LONG ISLAND | BAHAMAS | 23.3N | 75.1W | 1611 | 03/21 |
| JEREMIE | HAITI | 18.6N | 74.1W | 1611 | 03/21 |
| RUTHS BAY | BERMUDA | 32.4N | 64.6W | 1612 | 03/21 |
| SANTIAGO D CUBA | CUBA | 19.9N | 75.8W | 1614 | 03/21 |
| GIBARA | CUBA | 21.1N | 76.1W | 1617 | 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1617 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1618 | 03/21 |
| EXUMA | BAHAMAS | 23.6N | 75.9W | 1619 | 03/21 |

| | | | | | |
|------------------|-----------------|-------|-------|------|-------|
| CAT ISLAND | BAHAMAS | 24.4N | 75.5W | 1619 | 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N | 74.1W | 1621 | 03/21 |
| ELEUTHERA ISLAND | BAHAMAS | 25.2N | 76.1W | 1625 | 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1633 | 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1633 | 03/21 |
| CAYMAN BRAC | CAYMAN ISLANDS | 19.7N | 79.9W | 1645 | 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1646 | 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1648 | 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1657 | 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1658 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1701 | 03/21 |
| GRAND CAYMAN | CAYMAN ISLANDS | 19.3N | 81.3W | 1701 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1703 | 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1704 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT

PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.

- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

PTWC Message #2

ZCZC

WECA41 PHEB 211425

TSUCAX

TSUNAMI MESSAGE NUMBER 2

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1425 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST...UPDATED

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ANTIGUA AND BARBUDA... BARBADOS... DOMINICA...
GUADELOUPE... MARTINIQUE... MONTSERRAT... SABA AND SAINT
EUSTATIUS... AND SAINT KITTS AND NEVIS.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

DOMINICAN REPUBLIC... FRENCH GUYANE... GUYANA...
SURINAME... VENEZUELA... ANGUILLA... ARUBA... BERMUDA...
BONAIRE... CURACAO... GRENADA... PUERTO RICO AND VIRGIN
ISLANDS... SAINT BARTHELEMY... SAINT LUCIA... SINT
MAARTEN... SAINT MARTIN... SAINT VINCENT AND THE
GRENADINES... AND TRINIDAD AND TOBAGO.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

BRAZIL... COLOMBIA... COSTA RICA... CUBA... HAITI...
NICARAGUA... PANAMA... BAHAMAS... JAMAICA... SAN ANDRES
AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) | |
|-----------------|------------------|-------------|-------|----------|-------|
| ----- | | | | | |
| PLYMOUTH | MONTERRAT | 16.7N | 62.2W | 1426 | 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1430 | 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1432 | 03/21 |
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1439 | 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1439 | 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1439 | 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1441 | 03/21 |
| SINT EUSTATIUS | SINT EUSTATIUS | 17.5N | 63.0W | 1443 | 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1443 | 03/21 |
| SABA | SABA | 17.6N | 63.2W | 1444 | 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1447 | 03/21 |
| THE VALLEY | ANGUILLA | 18.3N | 63.1W | 1449 | 03/21 |
| CHRISTIANSTED | US VIRGIN IS | 17.7N | 64.7W | 1451 | 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1453 | 03/21 |
| ANEGADA | BR VIRGIN IS | 18.8N | 64.3W | 1453 | 03/21 |
| SIMPSON BAAI | SINT MAARTEN | 18.0N | 63.1W | 1455 | 03/21 |
| SAN JUAN | PUERTO RICO | 18.5N | 66.1W | 1455 | 03/21 |
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1507 | 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N | 67.2W | 1508 | 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1513 | 03/21 |
| CHARLOTTE AMALI | US VIRGIN IS | 18.3N | 64.9W | 1513 | 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1515 | 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1518 | 03/21 |
| SAINT GEORGES | GRENADA | 12.0N | 61.8W | 1520 | 03/21 |
| CABO ENGANO | DOMINICAN REP | 18.6N | 68.3W | 1521 | 03/21 |
| PUERTO PLATA | DOMINICAN REP | 19.8N | 70.7W | 1523 | 03/21 |
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1529 | 03/21 |
| GRAND TURK | TURKS N CAICOS | 21.5N | 71.1W | 1531 | 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1532 | 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| CAP HAITEN | HAITI | 19.8N | 72.2W | 1540 | 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1542 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1544 | 03/21 |
| MAYAGUANA | BAHAMAS | 22.3N | 73.0W | 1547 | 03/21 |
| WEST CAICOS | TURKS N CAICOS | 21.7N | 72.5W | 1548 | 03/21 |
| BARACOA | CUBA | 20.4N | 74.5W | 1559 | 03/21 |
| JACAMEL | HAITI | 18.1N | 72.5W | 1600 | 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N | 73.7W | 1601 | 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1601 | 03/21 |
| SAN SALVADOR | BAHAMAS | 24.1N | 74.5W | 1602 | 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1607 | 03/21 |
| LONG ISLAND | BAHAMAS | 23.3N | 75.1W | 1611 | 03/21 |
| JEREMIE | HAITI | 18.6N | 74.1W | 1611 | 03/21 |
| RUTHS BAY | BERMUDA | 32.4N | 64.6W | 1612 | 03/21 |
| GIBARA | CUBA | 21.1N | 76.1W | 1617 | 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1617 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1618 | 03/21 |
| EXUMA | BAHAMAS | 23.6N | 75.9W | 1619 | 03/21 |
| CAT ISLAND | BAHAMAS | 24.4N | 75.5W | 1619 | 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N | 74.1W | 1621 | 03/21 |
| ELEUTHERA ISLAN | BAHAMAS | 25.2N | 76.1W | 1625 | 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1633 | 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1633 | 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1646 | 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1648 | 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1657 | 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1658 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1701 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1703 | 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1704 | 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1711 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1712 | 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1713 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1716 | 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1725 | 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1731 | 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1732 | 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1735 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1743 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1747 | 03/21 |
| CAYENNE | FRENCH GUYANE | 4.9N | 52.3W | 1801 | 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1803 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1805 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1817 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1828 | 03/21 |

| | | | | | |
|-----------------|-----------|-------|-------|------|-------|
| GEORGETOWN | GUYANA | 6.8N | 58.2W | 1847 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1855 | 03/21 |
| PARAMARIBO | SURINAME | 5.9N | 55.2W | 1904 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 1912 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1928 | 03/21 |
| ILHA DE MARACA | BRAZIL | 2.2N | 50.5W | 2147 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2222 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LON | | | |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1414 | 14.72M/48.3FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #3

ZCZC

WECA41 PHEB 211525

TSUCAX

TSUNAMI MESSAGE NUMBER 3

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1525 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

* AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.

* TSUNAMI WAVES HAVE BEEN OBSERVED.

* BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ANTIGUA AND BARBUDA... BARBADOS... DOMINICA...
GUADELOUPE... MARTINIQUE... MONTSERRAT... SABA AND SAINT
EUSTATIUS... AND SAINT KITTS AND NEVIS.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

DOMINICAN REPUBLIC... FRENCH GUYANE... GUYANA...
SURINAME... VENEZUELA... ANGUILLA... ARUBA... BERMUDA...
BONAIRE... CURACAO... GRENADA... PUERTO RICO AND VIRGIN
ISLANDS... SAINT BARTHELEMY... SAINT LUCIA... SINT
MAARTEN... SAINT MARTIN... SAINT VINCENT AND THE
GRENADINES... AND TRINIDAD AND TOBAGO.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

BRAZIL... COLOMBIA... COSTA RICA... CUBA... HAITI...
NICARAGUA... PANAMA... BAHAMAS... JAMAICA... SAN ANDRES
AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) | |
|-----------------|------------------|-------------|-------|----------|-------|
| PLYMOUTH | MONTERRAT | 16.7N | 62.2W | 1426 | 03/21 |
| BASSE TERRE | GUADELOUPE | 16.0N | 61.7W | 1430 | 03/21 |
| ROSEAU | DOMINICA | 15.3N | 61.4W | 1432 | 03/21 |
| CASTRIES | SAINT LUCIA | 14.0N | 61.0W | 1439 | 03/21 |
| FORT DE FRANCE | MARTINIQUE | 14.6N | 61.1W | 1439 | 03/21 |
| SAINT JOHNS | ANTIGUA | 17.1N | 61.9W | 1439 | 03/21 |
| PALMETTO POINT | BARBUDA | 17.6N | 61.9W | 1441 | 03/21 |
| SINT EUSTATIUS | SINT EUSTATIUS | 17.5N | 63.0W | 1443 | 03/21 |
| BASSETERRE | SAINT KITTS | 17.3N | 62.7W | 1443 | 03/21 |
| SABA | SABA | 17.6N | 63.2W | 1444 | 03/21 |
| BRIDGETOWN | BARBADOS | 13.1N | 59.6W | 1447 | 03/21 |
| THE VALLEY | ANGUILLA | 18.3N | 63.1W | 1449 | 03/21 |
| CHRISTIANSTED | US VIRGIN IS | 17.7N | 64.7W | 1451 | 03/21 |
| KINGSTOWN | SAINT VINCENT | 13.1N | 61.2W | 1453 | 03/21 |
| ANEGADA | BR VIRGIN IS | 18.8N | 64.3W | 1453 | 03/21 |
| SIMPSON BAAI | SINT MAARTEN | 18.0N | 63.1W | 1455 | 03/21 |
| SAN JUAN | PUERTO RICO | 18.5N | 66.1W | 1455 | 03/21 |
| ROADTOWN | BR VIRGIN IS | 18.4N | 64.6W | 1507 | 03/21 |
| MAYAGUEZ | PUERTO RICO | 18.2N | 67.2W | 1508 | 03/21 |
| SAINT BARTHELEM | SAINT BARTHELEMY | 17.9N | 62.8W | 1513 | 03/21 |
| CHARLOTTE AMALI | US VIRGIN IS | 18.3N | 64.9W | 1513 | 03/21 |
| BAIE LUCAS | SAINT MARTIN | 18.1N | 63.0W | 1515 | 03/21 |
| BAIE GRAND CASE | SAINT MARTIN | 18.1N | 63.1W | 1518 | 03/21 |
| SAINT GEORGES | GRENADA | 12.0N | 61.8W | 1520 | 03/21 |
| CABO ENGANO | DOMINICAN REP | 18.6N | 68.3W | 1521 | 03/21 |
| PUERTO PLATA | DOMINICAN REP | 19.8N | 70.7W | 1523 | 03/21 |
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1529 | 03/21 |
| GRAND TURK | TURKS N CAICOS | 21.5N | 71.1W | 1531 | 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1532 | 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| CAP HAITEN | HAITI | 19.8N | 72.2W | 1540 | 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1542 | 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1544 | 03/21 |
| MAYAGUANA | BAHAMAS | 22.3N | 73.0W | 1547 | 03/21 |
| WEST CAICOS | TURKS N CAICOS | 21.7N | 72.5W | 1548 | 03/21 |
| BARACOA | CUBA | 20.4N | 74.5W | 1559 | 03/21 |
| JACAMEL | HAITI | 18.1N | 72.5W | 1600 | 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N | 73.7W | 1601 | 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1601 | 03/21 |
| SAN SALVADOR | BAHAMAS | 24.1N | 74.5W | 1602 | 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1607 | 03/21 |
| LONG ISLAND | BAHAMAS | 23.3N | 75.1W | 1611 | 03/21 |
| JEREMIE | HAITI | 18.6N | 74.1W | 1611 | 03/21 |
| RUTHS BAY | BERMUDA | 32.4N | 64.6W | 1612 | 03/21 |
| GIBARA | CUBA | 21.1N | 76.1W | 1617 | 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1617 | 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1618 | 03/21 |
| EXUMA | BAHAMAS | 23.6N | 75.9W | 1619 | 03/21 |
| CAT ISLAND | BAHAMAS | 24.4N | 75.5W | 1619 | 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N | 74.1W | 1621 | 03/21 |
| ELEUTHERA ISLAN | BAHAMAS | 25.2N | 76.1W | 1625 | 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1633 | 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1633 | 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1646 | 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1648 | 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1657 | 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1658 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1701 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1703 | 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1704 | 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1711 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1712 | 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1713 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1716 | 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1725 | 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1731 | 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1732 | 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1735 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1743 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1747 | 03/21 |
| CAYENNE | FRENCH GUYANE | 4.9N | 52.3W | 1801 | 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1803 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1805 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1817 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1828 | 03/21 |

| | | | | | |
|-----------------|-----------|-------|-------|------|-------|
| GEORGETOWN | GUYANA | 6.8N | 58.2W | 1847 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1855 | 03/21 |
| PARAMARIBO | SURINAME | 5.9N | 55.2W | 1904 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 1912 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1928 | 03/21 |
| ILHA DE MARACA | BRAZIL | 2.2N | 50.5W | 2147 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2222 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LON | | | |
| MONA ISLAND PR | 18.1N | 67.9W | 1525 | 1.01M/ 3.3FT | 28 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1517 | 2.10M/ 6.9FT | 22 |
| DART 41420 | 23.5N | 67.3W | 1518 | 0.08M/ 0.3FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1517 | 0.86M/ 2.8FT | 28 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1522 | 0.86M/ 2.8FT | 22 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1513 | 1.47M/ 4.8FT | 28 |

| | | | | | |
|---------------------|-------|-------|------|---------------|----|
| ARECIBO PR | 18.5N | 66.7W | 1507 | 0.77M/ 2.5FT | 16 |
| YABUcoa PR | 18.1N | 65.8W | 1507 | 1.90M/ 6.2FT | 18 |
| DART 41421 | 23.4N | 63.9W | 1503 | 0.16M/ 0.5FT | 20 |
| SAN JUAN PR | 18.5N | 66.1W | 1500 | 0.89M/ 2.9FT | 24 |
| LIMETREE VI | 17.7N | 64.8W | 1506 | 1.19M/ 3.9FT | 26 |
| CALLIAQUA VC | 13.1N | 61.2W | 1502 | 1.56M/ 5.1FT | 18 |
| ST CROIX VI | 17.7N | 64.7W | 1502 | 1.19M/ 3.9FT | 26 |
| BARBUDA AG | 17.6N | 61.8W | 1455 | 4.26M/14.0FT | 26 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1501 | 2.08M/ 6.8FT | 26 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1455 | 2.23M/ 7.3FT | 20 |
| BASSETERRE KN | 17.3N | 62.7W | 1457 | 2.76M/ 9.1FT | 22 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1451 | 2.84M/ 9.3FT | 22 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1441 | 2.84M/ 9.3FT | 16 |
| ROSEAU DM | 15.3N | 61.4W | 1442 | 3.23M/10.6FT | 24 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1442 | 2.62M/ 8.6FT | 14 |
| POINT A PITRE GP | 16.2N | 61.5W | 1439 | 20.10M/65.9FT | 20 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1427 | 6.35M/20.8FT | 24 |
| PARHAM AT | 17.1N | 61.8W | 1430 | 12.98M/42.6FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1414 | 14.72M/48.3FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #4

ZCZC

WECA41 PHEB 211625

TSUCAX

TSUNAMI MESSAGE NUMBER 4

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1625 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ANTIGUA AND BARBUDA... BARBADOS... DOMINICA...
GUADELOUPE... MARTINIQUE... MONTSERRAT... SABA AND SAINT
EUSTATIUS... AND SAINT KITTS AND NEVIS.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

DOMINICAN REPUBLIC... FRENCH GUYANE... GUYANA...
SURINAME... VENEZUELA... ANGUILLA... ARUBA... BERMUDA...
BONAIRE... CURACAO... GRENADA... PUERTO RICO AND VIRGIN
ISLANDS... SAINT BARTHELEMY... SAINT LUCIA... SINT
MAARTEN... SAINT MARTIN... SAINT VINCENT AND THE
GRENADINES... AND TRINIDAD AND TOBAGO.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

BRAZIL... COLOMBIA... COSTA RICA... CUBA... HAITI...
NICARAGUA... PANAMA... BAHAMAS... JAMAICA... SAN ANDRES
AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|-----------------|-------------|-------|------------|
| BAIE BLANCHE | SAINT MARTIN | 18.1N | 63.0W | 1529 03/21 |
| GRAND TURK | TURKS N CAICOS | 21.5N | 71.1W | 1531 03/21 |
| PIRATES BAY | TRINIDAD TOBAGO | 11.3N | 60.6W | 1532 03/21 |
| CAP HAITEN | HAITI | 19.8N | 72.2W | 1540 03/21 |
| SANTO DOMINGO | DOMINICAN REP | 18.5N | 69.9W | 1542 03/21 |
| ONIMA | BONAIRE | 12.3N | 68.3W | 1544 03/21 |
| MAYAGUANA | BAHAMAS | 22.3N | 73.0W | 1547 03/21 |
| WEST CAICOS | TURKS N CAICOS | 21.7N | 72.5W | 1548 03/21 |
| BARACOA | CUBA | 20.4N | 74.5W | 1559 03/21 |
| JACAMEL | HAITI | 18.1N | 72.5W | 1600 03/21 |
| GREAT INAGUA | BAHAMAS | 20.9N | 73.7W | 1601 03/21 |
| ORANJESTAD | ARUBA | 12.5N | 70.0W | 1601 03/21 |
| SAN SALVADOR | BAHAMAS | 24.1N | 74.5W | 1602 03/21 |
| MAIQUETIA | VENEZUELA | 10.6N | 67.0W | 1607 03/21 |
| LONG ISLAND | BAHAMAS | 23.3N | 75.1W | 1611 03/21 |
| JEREMIE | HAITI | 18.6N | 74.1W | 1611 03/21 |
| RUTHS BAY | BERMUDA | 32.4N | 64.6W | 1612 03/21 |
| GIBARA | CUBA | 21.1N | 76.1W | 1617 03/21 |
| CUMANA | VENEZUELA | 10.5N | 64.2W | 1617 03/21 |
| WILLEMSTAD | CURACAO | 12.1N | 68.9W | 1618 03/21 |
| EXUMA | BAHAMAS | 23.6N | 75.9W | 1619 03/21 |
| CAT ISLAND | BAHAMAS | 24.4N | 75.5W | 1619 03/21 |
| CROOKED ISLAND | BAHAMAS | 22.7N | 74.1W | 1621 03/21 |
| ELEUTHERA ISLAN | BAHAMAS | 25.2N | 76.1W | 1625 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1633 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1633 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1646 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1648 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1657 03/21 |

| | | | | | |
|-----------------|------------------|-------|-------|------|-------|
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1658 | 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1701 | 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1703 | 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1704 | 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1711 | 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1712 | 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1713 | 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1716 | 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1725 | 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1731 | 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1732 | 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1735 | 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1743 | 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1747 | 03/21 |
| CAYENNE | FRENCH GUYANE | 4.9N | 52.3W | 1801 | 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1803 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1805 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1817 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1828 | 03/21 |
| GEORGETOWN | GUYANA | 6.8N | 58.2W | 1847 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1855 | 03/21 |
| PARAMARIBO | SURINAME | 5.9N | 55.2W | 1904 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 1912 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1928 | 03/21 |
| ILHA DE MARACA | BRAZIL | 2.2N | 50.5W | 2147 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2222 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

* THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | LON | | | |
| BERMUDA UK | 32.4N | 64.7W | 1622 | 0.75M/ 2.4FT | 18 |
| TORTOLA VI UK | 18.4N | 64.6W | 1612 | 1.68M/ 5.5FT | 24 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1614 | 1.29M/ 4.2FT | 26 |
| JACMEL HT | 18.2N | 72.5W | 1614 | 0.83M/ 2.7FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1607 | 1.55M/ 5.1FT | 22 |
| BARAHONA DO | 18.2N | 71.1W | 1600 | 0.90M/ 3.0FT | 26 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1548 | 0.41M/ 1.3FT | 16 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1541 | 1.29M/ 4.2FT | 22 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1534 | 1.29M/ 4.2FT | 26 |
| DART 42407 | 15.3N | 68.2W | 1535 | 0.13M/ 0.4FT | 22 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1531 | 1.25M/ 4.1FT | 18 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1535 | 0.57M/ 1.9FT | 28 |
| PUNTA CANA DO | 18.5N | 68.4W | 1534 | 1.11M/ 3.6FT | 24 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1527 | 1.82M/ 6.0FT | 14 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1531 | 1.50M/ 4.9FT | 26 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1527 | 1.68M/ 5.5FT | 28 |
| MONA ISLAND PR | 18.1N | 67.9W | 1525 | 1.01M/ 3.3FT | 28 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1517 | 2.10M/ 6.9FT | 22 |
| DART 41420 | 23.5N | 67.3W | 1518 | 0.08M/ 0.3FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1517 | 0.86M/ 2.8FT | 28 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1522 | 0.86M/ 2.8FT | 22 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1513 | 1.47M/ 4.8FT | 28 |
| ARECIBO PR | 18.5N | 66.7W | 1507 | 0.77M/ 2.5FT | 16 |
| YABUCOA PR | 18.1N | 65.8W | 1507 | 1.90M/ 6.2FT | 18 |
| DART 41421 | 23.4N | 63.9W | 1503 | 0.16M/ 0.5FT | 20 |
| SAN JUAN PR | 18.5N | 66.1W | 1500 | 0.89M/ 2.9FT | 24 |
| LIMETREE VI | 17.7N | 64.8W | 1506 | 1.19M/ 3.9FT | 26 |
| CALLIAQUA VC | 13.1N | 61.2W | 1502 | 1.56M/ 5.1FT | 18 |
| ST CROIX VI | 17.7N | 64.7W | 1502 | 1.19M/ 3.9FT | 26 |
| BARBUDA AG | 17.6N | 61.8W | 1455 | 4.26M/14.0FT | 26 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1501 | 2.08M/ 6.8FT | 26 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1455 | 2.23M/ 7.3FT | 20 |
| BASSETERRE KN | 17.3N | 62.7W | 1457 | 2.76M/ 9.1FT | 22 |

| | | | | | |
|---------------------|-------|-------|------|---------------|----|
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1451 | 2.84M/ 9.3FT | 22 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1441 | 2.84M/ 9.3FT | 16 |
| ROSEAU DM | 15.3N | 61.4W | 1442 | 3.23M/10.6FT | 24 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1442 | 2.62M/ 8.6FT | 14 |
| POINT A PITRE GP | 16.2N | 61.5W | 1439 | 20.10M/65.9FT | 20 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1427 | 6.35M/20.8FT | 24 |
| PARHAM AT | 17.1N | 61.8W | 1430 | 12.98M/42.6FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1414 | 14.72M/48.3FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #5

ZCZC
WECA41 PHEB 211725
TSUCAX

TSUNAMI MESSAGE NUMBER 5
NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI
1725 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.

- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ANTIGUA AND BARBUDA... BARBADOS... DOMINICA...
GUADELOUPE... MARTINIQUE... MONTSERRAT... SABA AND SAINT
EUSTATIUS... AND SAINT KITTS AND NEVIS.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

DOMINICAN REPUBLIC... FRENCH GUYANE... GUYANA...
SURINAME... VENEZUELA... ANGUILLA... ARUBA... BERMUDA...
BONAIRE... CURACAO... GRENADA... PUERTO RICO AND VIRGIN
ISLANDS... SAINT BARTHELEMY... SAINT LUCIA... SINT
MAARTEN... SAINT MARTIN... SAINT VINCENT AND THE
GRENADINES... AND TRINIDAD AND TOBAGO.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

BRAZIL... COLOMBIA... COSTA RICA... CUBA... HAITI...
NICARAGUA... PANAMA... BAHAMAS... JAMAICA... SAN ANDRES
AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.
- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|------------------|-------------|-------|------------|
| ELEUTHERA ISLAN | BAHAMAS | 25.2N | 76.1W | 1625 03/21 |
| PORT OF SPAIN | TRINIDAD TOBAGO | 10.6N | 61.5W | 1633 03/21 |
| ANDROS ISLAND | BAHAMAS | 25.0N | 77.9W | 1633 03/21 |
| NASSAU | BAHAMAS | 25.1N | 77.4W | 1646 03/21 |
| SANTA MARTA | COLOMBIA | 11.2N | 74.2W | 1648 03/21 |
| MONTEGO BAY | JAMAICA | 18.5N | 77.9W | 1657 03/21 |
| FREEPORT | BAHAMAS | 26.5N | 78.8W | 1658 03/21 |
| ABACO ISLAND | BAHAMAS | 26.6N | 77.1W | 1701 03/21 |
| CARTAGENA | COLOMBIA | 10.4N | 75.6W | 1703 03/21 |
| PORT AU PRINCE | HAITI | 18.5N | 72.4W | 1704 03/21 |
| BIMINI | BAHAMAS | 25.8N | 79.3W | 1711 03/21 |
| BARRANQUILLA | COLOMBIA | 11.1N | 74.9W | 1712 03/21 |
| KINGSTON | JAMAICA | 17.9N | 76.9W | 1713 03/21 |
| RIOHACHA | COLOMBIA | 11.6N | 72.9W | 1716 03/21 |
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1725 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1731 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1732 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1735 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1743 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1747 03/21 |
| CAYENNE | FRENCH GUYANE | 4.9N | 52.3W | 1801 03/21 |

| | | | | | |
|-----------------|------------|-------|-------|------|-------|
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1803 | 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1805 | 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1817 | 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1828 | 03/21 |
| GEORGETOWN | GUYANA | 6.8N | 58.2W | 1847 | 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1855 | 03/21 |
| PARAMARIBO | SURINAME | 5.9N | 55.2W | 1904 | 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 1912 | 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1928 | 03/21 |
| ILHA DE MARACA | BRAZIL | 2.2N | 50.5W | 2147 | 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2222 | 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD |
|-------------------|-------------------|-------|-----------------|------------------------|-------------|
| | LAT | LON | (UTC) | | (MIN) |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1718 | 0.72M/ 2.3FT | 22 |
| DART 44401 | 37.5N | 50.0W | 1710 | 0.15M/ 0.5FT | 26 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1707 | 0.13M/ 0.4FT | 22 |
| SANTA MARTA CO | 11.2N | 74.2W | 1654 | 0.59M/ 1.9FT | 24 |

| | | | | | | |
|---------------------|-------|-------|------|---------|--------|----|
| PORT OF SPAIN TT | 10.6N | 61.5W | 1641 | 1.16M/ | 3.8FT | 28 |
| DART 41424 | 32.9N | 72.5W | 1647 | 0.07M/ | 0.2FT | 18 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1635 | 0.85M/ | 2.8FT | 14 |
| BERMUDA UK | 32.4N | 64.7W | 1622 | 0.75M/ | 2.4FT | 18 |
| TORTOLA VI UK | 18.4N | 64.6W | 1612 | 1.68M/ | 5.5FT | 24 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1614 | 1.29M/ | 4.2FT | 26 |
| JACMEL HT | 18.2N | 72.5W | 1614 | 0.83M/ | 2.7FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1607 | 1.55M/ | 5.1FT | 22 |
| BARAHONA DO | 18.2N | 71.1W | 1600 | 0.90M/ | 3.0FT | 26 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1548 | 0.41M/ | 1.3FT | 16 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1541 | 1.29M/ | 4.2FT | 22 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1534 | 1.29M/ | 4.2FT | 26 |
| DART 42407 | 15.3N | 68.2W | 1535 | 0.13M/ | 0.4FT | 22 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1531 | 1.25M/ | 4.1FT | 18 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1535 | 0.57M/ | 1.9FT | 28 |
| PUNTA CANA DO | 18.5N | 68.4W | 1534 | 1.11M/ | 3.6FT | 24 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1527 | 1.82M/ | 6.0FT | 14 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1531 | 1.50M/ | 4.9FT | 26 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1527 | 1.68M/ | 5.5FT | 28 |
| MONA ISLAND PR | 18.1N | 67.9W | 1525 | 1.01M/ | 3.3FT | 28 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1517 | 2.10M/ | 6.9FT | 22 |
| DART 41420 | 23.5N | 67.3W | 1518 | 0.08M/ | 0.3FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1517 | 0.86M/ | 2.8FT | 28 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1522 | 0.86M/ | 2.8FT | 22 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1513 | 1.47M/ | 4.8FT | 28 |
| ARECIBO PR | 18.5N | 66.7W | 1507 | 0.77M/ | 2.5FT | 16 |
| YABUCOA PR | 18.1N | 65.8W | 1507 | 1.90M/ | 6.2FT | 18 |
| DART 41421 | 23.4N | 63.9W | 1503 | 0.16M/ | 0.5FT | 20 |
| SAN JUAN PR | 18.5N | 66.1W | 1500 | 0.89M/ | 2.9FT | 24 |
| LIMETREE VI | 17.7N | 64.8W | 1506 | 1.19M/ | 3.9FT | 26 |
| CALLIAQUA VC | 13.1N | 61.2W | 1502 | 1.56M/ | 5.1FT | 18 |
| ST CROIX VI | 17.7N | 64.7W | 1502 | 1.19M/ | 3.9FT | 26 |
| BARBUDA AG | 17.6N | 61.8W | 1455 | 4.26M/ | 14.0FT | 26 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1501 | 2.08M/ | 6.8FT | 26 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1455 | 2.23M/ | 7.3FT | 20 |
| BASSETERRE KN | 17.3N | 62.7W | 1457 | 2.76M/ | 9.1FT | 22 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1451 | 2.84M/ | 9.3FT | 22 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1441 | 2.84M/ | 9.3FT | 16 |
| ROSEAU DM | 15.3N | 61.4W | 1442 | 3.23M/ | 10.6FT | 24 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1442 | 2.62M/ | 8.6FT | 14 |
| POINT A PITRE GP | 16.2N | 61.5W | 1439 | 20.10M/ | 65.9FT | 20 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1427 | 6.35M/ | 20.8FT | 24 |
| PARHAM AT | 17.1N | 61.8W | 1430 | 12.98M/ | 42.6FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1414 | 14.72M/ | 48.3FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #6

ZCZC

WECA41 PHEB 211825

TSUCAX

TSUNAMI MESSAGE NUMBER 6

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1825 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST...UPDATED

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ANTIGUA AND BARBUDA... BARBADOS... DOMINICA...
GUADELOUPE... MARTINIQUE... MONTSERRAT... SABA AND SAINT
EUSTATIUS... AND SAINT KITTS AND NEVIS.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

DOMINICAN REPUBLIC... FRENCH GUYANE... GUYANA...
SURINAME... VENEZUELA... ANGUILLA... ARUBA... BERMUDA...
BONAIRE... CURACAO... GRENADA... PUERTO RICO AND VIRGIN
ISLANDS... SAINT BARTHELEMY... SAINT LUCIA... SINT
MAARTEN... SAINT MARTIN... SAINT VINCENT AND THE
GRENADINES... AND TRINIDAD AND TOBAGO.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

BRAZIL... COLOMBIA... COSTA RICA... CUBA... HAITI...
NICARAGUA... PANAMA... BAHAMAS... JAMAICA... SAN ANDRES
AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

* PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|------------------|-------------|-------|------------|
| ALIGANDI | PANAMA | 9.2N | 78.0W | 1725 03/21 |
| PUERTO CARRETO | PANAMA | 8.8N | 77.6W | 1731 03/21 |
| SAN ANDRES | SAN ANDRES PROVI | 13.4N | 81.4W | 1732 03/21 |
| PROVIDENCIA | SAN ANDRES PROVI | 12.6N | 81.7W | 1735 03/21 |
| PUERTO OBALDIA | PANAMA | 8.7N | 77.4W | 1743 03/21 |
| PUNTA CARIBANA | COLOMBIA | 8.6N | 76.9W | 1747 03/21 |
| CAYENNE | FRENCH GUYANE | 4.9N | 52.3W | 1801 03/21 |
| PUERTO LIMON | COSTA RICA | 10.0N | 83.0W | 1803 03/21 |
| COLON | PANAMA | 9.4N | 79.9W | 1805 03/21 |
| BOCAS DEL TORO | PANAMA | 9.4N | 82.2W | 1817 03/21 |
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1828 03/21 |
| GEORGETOWN | GUYANA | 6.8N | 58.2W | 1847 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1855 03/21 |
| PARAMARIBO | SURINAME | 5.9N | 55.2W | 1904 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 1912 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1928 03/21 |
| ILHA DE MARACA | BRAZIL | 2.2N | 50.5W | 2147 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2222 03/21 |

POTENTIAL IMPACTS

* A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.

* IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.

* IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.

* PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

* THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------|-------------------|
| | LAT | LON | | | | |
| LIMON CR | 10.0N | 83.2W | 1825 | 0.35M/ | 1.1FT | 28 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1817 | 0.09M/ | 0.3FT | 24 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1811 | 0.09M/ | 0.3FT | 20 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1800 | 0.10M/ | 0.3FT | 26 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1757 | 0.09M/ | 0.3FT | 20 |
| HATTERAS NC | 35.2N | 75.7W | 1803 | 0.66M/ | 2.2FT | 16 |
| SAPZURRO CO | 8.7N | 77.4W | 1758 | 0.40M/ | 1.3FT | 20 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1756 | 0.07M/ | 0.2FT | 20 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1748 | 0.08M/ | 0.3FT | 18 |
| EL PORVENIR PA | 9.6N | 78.9W | 1750 | 0.43M/ | 1.4FT | 18 |
| SAN ANDRES CO | 12.6N | 81.7W | 1742 | 0.34M/ | 1.1FT | 24 |
| ILE ROYAL GUIANA FR | 5.3N | 52.6W | 1741 | 0.74M/ | 2.4FT | 18 |
| COVENAS CO | 9.4N | 76.2W | 1743 | 0.42M/ | 1.4FT | 28 |
| DART 44402 | 39.3N | 70.7W | 1729 | 0.09M/ | 0.3FT | 18 |
| PORT ROYAL JM | 17.9N | 76.8W | 1728 | 0.95M/ | 3.1FT | 20 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1718 | 0.72M/ | 2.3FT | 22 |
| DART 44401 | 37.5N | 50.0W | 1710 | 0.15M/ | 0.5FT | 26 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1707 | 0.13M/ | 0.4FT | 22 |
| SANTA MARTA CO | 11.2N | 74.2W | 1654 | 0.59M/ | 1.9FT | 24 |
| PORT OF SPAIN TT | 10.6N | 61.5W | 1641 | 1.16M/ | 3.8FT | 28 |
| DART 41424 | 32.9N | 72.5W | 1647 | 0.07M/ | 0.2FT | 18 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1635 | 0.85M/ | 2.8FT | 14 |
| BERMUDA UK | 32.4N | 64.7W | 1622 | 0.75M/ | 2.4FT | 18 |
| TORTOLA VI UK | 18.4N | 64.6W | 1612 | 1.68M/ | 5.5FT | 24 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1614 | 1.29M/ | 4.2FT | 26 |
| JACMEL HT | 18.2N | 72.5W | 1614 | 0.83M/ | 2.7FT | 22 |

| | | | | | | |
|---------------------|-------|-------|------|---------|--------|----|
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1607 | 1.55M/ | 5.1FT | 22 |
| BARAHONA DO | 18.2N | 71.1W | 1600 | 0.90M/ | 3.0FT | 26 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1548 | 0.41M/ | 1.3FT | 16 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1541 | 1.29M/ | 4.2FT | 22 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1534 | 1.29M/ | 4.2FT | 26 |
| DART 42407 | 15.3N | 68.2W | 1535 | 0.13M/ | 0.4FT | 22 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1531 | 1.25M/ | 4.1FT | 18 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1535 | 0.57M/ | 1.9FT | 28 |
| PUNTA CANA DO | 18.5N | 68.4W | 1534 | 1.11M/ | 3.6FT | 24 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1527 | 1.82M/ | 6.0FT | 14 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1531 | 1.50M/ | 4.9FT | 26 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1527 | 1.68M/ | 5.5FT | 28 |
| MONA ISLAND PR | 18.1N | 67.9W | 1525 | 1.01M/ | 3.3FT | 28 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1517 | 2.10M/ | 6.9FT | 22 |
| DART 41420 | 23.5N | 67.3W | 1518 | 0.08M/ | 0.3FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1517 | 0.86M/ | 2.8FT | 28 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1522 | 0.86M/ | 2.8FT | 22 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1513 | 1.47M/ | 4.8FT | 28 |
| ARECIBO PR | 18.5N | 66.7W | 1507 | 0.77M/ | 2.5FT | 16 |
| YABUCOA PR | 18.1N | 65.8W | 1507 | 1.90M/ | 6.2FT | 18 |
| DART 41421 | 23.4N | 63.9W | 1503 | 0.16M/ | 0.5FT | 20 |
| SAN JUAN PR | 18.5N | 66.1W | 1500 | 0.89M/ | 2.9FT | 24 |
| LIMETREE VI | 17.7N | 64.8W | 1506 | 1.19M/ | 3.9FT | 26 |
| CALLIAQUA VC | 13.1N | 61.2W | 1502 | 1.56M/ | 5.1FT | 18 |
| ST CROIX VI | 17.7N | 64.7W | 1502 | 1.19M/ | 3.9FT | 26 |
| BARBUDA AG | 17.6N | 61.8W | 1455 | 4.26M/ | 14.0FT | 26 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1501 | 2.08M/ | 6.8FT | 26 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1455 | 2.23M/ | 7.3FT | 20 |
| BASSETERRE KN | 17.3N | 62.7W | 1457 | 2.76M/ | 9.1FT | 22 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1451 | 2.84M/ | 9.3FT | 22 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1441 | 2.84M/ | 9.3FT | 16 |
| ROSEAU DM | 15.3N | 61.4W | 1442 | 3.23M/ | 10.6FT | 24 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1442 | 2.62M/ | 8.6FT | 14 |
| POINT A PITRE GP | 16.2N | 61.5W | 1439 | 20.10M/ | 65.9FT | 20 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1427 | 6.35M/ | 20.8FT | 24 |
| PARHAM AT | 17.1N | 61.8W | 1430 | 12.98M/ | 42.6FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1414 | 14.72M/ | 48.3FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

* THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.

- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #7

ZCZC

WECA41 PHEB 211925

TSUCAX

TSUNAMI MESSAGE NUMBER 7

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

1925 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * TSUNAMI WAVES HAVE BEEN OBSERVED.
- * BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ANTIGUA AND BARBUDA... BARBADOS... DOMINICA...
GUADELOUPE... MARTINIQUE... MONTSERRAT... SABA AND SAINT
EUSTATIUS... AND SAINT KITTS AND NEVIS.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

DOMINICAN REPUBLIC... FRENCH GUYANE... GUYANA...
SURINAME... VENEZUELA... ANGUILLA... ARUBA... BERMUDA...
BONAIRE... CURACAO... GRENADA... PUERTO RICO AND VIRGIN
ISLANDS... SAINT BARTHELEMY... SAINT LUCIA... SINT
MAARTEN... SAINT MARTIN... SAINT VINCENT AND THE
GRENADINES... AND TRINIDAD AND TOBAGO.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

BRAZIL... COLOMBIA... COSTA RICA... CUBA... HAITI...
NICARAGUA... PANAMA... BAHAMAS... JAMAICA... SAN ANDRES
AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|-----------|-------------|-------|------------|
| PUNTO FIJO | VENEZUELA | 11.7N | 70.2W | 1828 03/21 |
| GEORGETOWN | GUYANA | 6.8N | 58.2W | 1847 03/21 |
| PUNTA GORDA | NICARAGUA | 11.4N | 83.8W | 1855 03/21 |
| PARAMARIBO | SURINAME | 5.9N | 55.2W | 1904 03/21 |
| PORLAMAR | VENEZUELA | 10.9N | 63.8W | 1912 03/21 |
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1928 03/21 |
| ILHA DE MARACA | BRAZIL | 2.2N | 50.5W | 2147 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2222 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

* THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------|-------------------|
| | LAT | LON | | | | |
| PALMEIRA CAPE VERDE | 16.8N | 23.0W | 1924 | 1.72M/ | 5.6FT | 14 |
| TELA HN | 15.8N | 87.5W | 1915 | 0.09M/ | 0.3FT | 28 |
| KEY WEST FL | 24.6N | 81.8W | 1922 | 0.05M/ | 0.2FT | 24 |
| PRAIA CV | 14.9N | 23.5W | 1916 | 0.97M/ | 3.2FT | 28 |
| MINDELO CV | 16.9N | 25.0W | 1910 | 1.71M/ | 5.6FT | 28 |
| VACA KEY FL | 24.7N | 81.1W | 1900 | 0.05M/ | 0.2FT | 16 |
| OREGON INLET NC | 35.8N | 75.5W | 1850 | 0.85M/ | 2.8FT | 18 |
| DUCK PIER NC | 36.2N | 75.7W | 1833 | 0.76M/ | 2.5FT | 28 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1831 | 0.07M/ | 0.2FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1829 | 0.08M/ | 0.3FT | 28 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1828 | 0.39M/ | 1.3FT | 26 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1828 | 0.08M/ | 0.3FT | 22 |
| LIMON CR | 10.0N | 83.2W | 1825 | 0.35M/ | 1.1FT | 28 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1817 | 0.09M/ | 0.3FT | 24 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1811 | 0.09M/ | 0.3FT | 20 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1800 | 0.10M/ | 0.3FT | 26 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1757 | 0.09M/ | 0.3FT | 20 |
| HATTERAS NC | 35.2N | 75.7W | 1803 | 0.66M/ | 2.2FT | 16 |
| SAPZURRO CO | 8.7N | 77.4W | 1758 | 0.40M/ | 1.3FT | 20 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1756 | 0.07M/ | 0.2FT | 20 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1748 | 0.08M/ | 0.3FT | 18 |
| EL PORVENIR PA | 9.6N | 78.9W | 1750 | 0.43M/ | 1.4FT | 18 |
| SAN ANDRES CO | 12.6N | 81.7W | 1742 | 0.34M/ | 1.1FT | 24 |
| ILE ROYAL GUIANA FR | 5.3N | 52.6W | 1741 | 0.74M/ | 2.4FT | 18 |
| COVENAS CO | 9.4N | 76.2W | 1743 | 0.42M/ | 1.4FT | 28 |
| DART 44402 | 39.3N | 70.7W | 1729 | 0.09M/ | 0.3FT | 18 |
| PORT ROYAL JM | 17.9N | 76.8W | 1728 | 0.95M/ | 3.1FT | 20 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1718 | 0.72M/ | 2.3FT | 22 |
| DART 44401 | 37.5N | 50.0W | 1710 | 0.15M/ | 0.5FT | 26 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1707 | 0.13M/ | 0.4FT | 22 |
| SANTA MARTA CO | 11.2N | 74.2W | 1654 | 0.59M/ | 1.9FT | 24 |
| PORT OF SPAIN TT | 10.6N | 61.5W | 1641 | 1.16M/ | 3.8FT | 28 |
| DART 41424 | 32.9N | 72.5W | 1647 | 0.07M/ | 0.2FT | 18 |

| | | | | | | |
|---------------------|-------|-------|------|---------|--------|----|
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1635 | 0.85M/ | 2.8FT | 14 |
| BERMUDA UK | 32.4N | 64.7W | 1622 | 0.75M/ | 2.4FT | 18 |
| TORTOLA VI UK | 18.4N | 64.6W | 1612 | 1.68M/ | 5.5FT | 24 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1614 | 1.29M/ | 4.2FT | 26 |
| JACMEL HT | 18.2N | 72.5W | 1614 | 0.83M/ | 2.7FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1607 | 1.55M/ | 5.1FT | 22 |
| BARAHONA DO | 18.2N | 71.1W | 1600 | 0.90M/ | 3.0FT | 26 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1548 | 0.41M/ | 1.3FT | 16 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1541 | 1.29M/ | 4.2FT | 22 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1534 | 1.29M/ | 4.2FT | 26 |
| DART 42407 | 15.3N | 68.2W | 1535 | 0.13M/ | 0.4FT | 22 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1531 | 1.25M/ | 4.1FT | 18 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1535 | 0.57M/ | 1.9FT | 28 |
| PUNTA CANA DO | 18.5N | 68.4W | 1534 | 1.11M/ | 3.6FT | 24 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1527 | 1.82M/ | 6.0FT | 14 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1531 | 1.50M/ | 4.9FT | 26 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1527 | 1.68M/ | 5.5FT | 28 |
| MONA ISLAND PR | 18.1N | 67.9W | 1525 | 1.01M/ | 3.3FT | 28 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1517 | 2.10M/ | 6.9FT | 22 |
| DART 41420 | 23.5N | 67.3W | 1518 | 0.08M/ | 0.3FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1517 | 0.86M/ | 2.8FT | 28 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1522 | 0.86M/ | 2.8FT | 22 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1513 | 1.47M/ | 4.8FT | 28 |
| ARECIBO PR | 18.5N | 66.7W | 1507 | 0.77M/ | 2.5FT | 16 |
| YABUCOA PR | 18.1N | 65.8W | 1507 | 1.90M/ | 6.2FT | 18 |
| DART 41421 | 23.4N | 63.9W | 1503 | 0.16M/ | 0.5FT | 20 |
| SAN JUAN PR | 18.5N | 66.1W | 1500 | 0.89M/ | 2.9FT | 24 |
| LIMETREE VI | 17.7N | 64.8W | 1506 | 1.19M/ | 3.9FT | 26 |
| CALLIAQUA VC | 13.1N | 61.2W | 1502 | 1.56M/ | 5.1FT | 18 |
| ST CROIX VI | 17.7N | 64.7W | 1502 | 1.19M/ | 3.9FT | 26 |
| BARBUDA AG | 17.6N | 61.8W | 1455 | 4.26M/ | 14.0FT | 26 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1501 | 2.08M/ | 6.8FT | 26 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1455 | 2.23M/ | 7.3FT | 20 |
| BASSETERRE KN | 17.3N | 62.7W | 1457 | 2.76M/ | 9.1FT | 22 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1451 | 2.84M/ | 9.3FT | 22 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1441 | 2.84M/ | 9.3FT | 16 |
| ROSEAU DM | 15.3N | 61.4W | 1442 | 3.23M/ | 10.6FT | 24 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1442 | 2.62M/ | 8.6FT | 14 |
| POINT A PITRE GP | 16.2N | 61.5W | 1439 | 20.10M/ | 65.9FT | 20 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1427 | 6.35M/ | 20.8FT | 24 |
| PARHAM AT | 17.1N | 61.8W | 1430 | 12.98M/ | 42.6FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1414 | 14.72M/ | 48.3FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.

- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.

- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.

- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #8

ZCZC

WECA41 PHEB 212025

TSUCAX

TSUNAMI MESSAGE NUMBER 8

NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI

2025 UTC TUE MAR 21 2017

...TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

* AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.

* TSUNAMI WAVES HAVE BEEN OBSERVED.

* BASED ON ALL AVAILABLE DATA... HAZARDOUS TSUNAMI WAVES ARE FORECAST FOR SOME COASTS.

TSUNAMI THREAT FORECAST

- * TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

ANTIGUA AND BARBUDA... BARBADOS... DOMINICA...
GUADELOUPE... MARTINIQUE... MONTSERRAT... SABA AND SAINT
EUSTATIUS... AND SAINT KITTS AND NEVIS.

- * TSUNAMI WAVES REACHING 1 TO 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

DOMINICAN REPUBLIC... FRENCH GUYANE... GUYANA...
SURINAME... VENEZUELA... ANGUILLA... ARUBA... BERMUDA...
BONAIRE... CURACAO... GRENADA... PUERTO RICO AND VIRGIN
ISLANDS... SAINT BARTHELEMY... SAINT LUCIA... SINT
MAARTEN... SAINT MARTIN... SAINT VINCENT AND THE
GRENADINES... AND TRINIDAD AND TOBAGO.

- * TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

BRAZIL... COLOMBIA... COSTA RICA... CUBA... HAITI...
NICARAGUA... PANAMA... BAHAMAS... JAMAICA... SAN ANDRES
AND PROVIDENCIA... AND TURKS AND CAICOS ISLANDS.

- * ACTUAL AMPLITUDES AT THE COAST MAY VARY FROM FORECAST AMPLITUDES DUE TO UNCERTAINTIES IN THE FORECAST AND LOCAL FEATURES. IN PARTICULAR MAXIMUM TSUNAMI AMPLITUDES ON ATOLLS OR SMALL ISLANDS AND AT LOCATIONS WITH FRINGING OR BARRIER REEFS WILL LIKELY BE MUCH SMALLER THAN THE FORECAST INDICATES.

- * FOR ALL OTHER AREAS COVERED BY THIS MESSAGE... THERE IS NO TSUNAMI THREAT ALTHOUGH SMALL SEA LEVEL CHANGES MAY OCCUR.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR THREATENED COASTAL AREAS SHOULD TAKE ACTION TO INFORM AND INSTRUCT ANY COASTAL POPULATIONS AT RISK IN ACCORDANCE WITH THEIR OWN EVALUATION... PROCEDURES AND THE LEVEL OF THREAT.

- * PERSONS LOCATED IN THREATENED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM NATIONAL AND LOCAL AUTHORITIES.

ESTIMATED TIMES OF ARRIVAL

- * ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITHIN THREATENED REGIONS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

| LOCATION | REGION | COORDINATES | | ETA(UTC) |
|-----------------|-----------|-------------|-------|------------|
| GOLFO VENEZUELA | VENEZUELA | 11.4N | 71.2W | 1928 03/21 |
| ILHA DE MARACA | BRAZIL | 2.2N | 50.5W | 2147 03/21 |
| PUERTO CABEZAS | NICARAGUA | 14.0N | 83.4W | 2222 03/21 |

POTENTIAL IMPACTS

- * A TSUNAMI IS A SERIES OF WAVES. THE TIME BETWEEN WAVE CRESTS CAN VARY FROM 5 MINUTES TO AN HOUR. THE HAZARD MAY PERSIST FOR MANY HOURS OR LONGER AFTER THE INITIAL WAVE.
- * IMPACTS CAN VARY SIGNIFICANTLY FROM ONE SECTION OF COAST TO THE NEXT DUE TO LOCAL BATHYMETRY AND THE SHAPE AND ELEVATION OF THE SHORELINE.
- * IMPACTS CAN ALSO VARY DEPENDING UPON THE STATE OF THE TIDE AT THE TIME OF THE MAXIMUM TSUNAMI WAVES.
- * PERSONS CAUGHT IN THE WATER OF A TSUNAMI MAY DROWN... BE CRUSHED BY DEBRIS IN THE WATER... OR BE SWEEPED OUT TO SEA.

TSUNAMI OBSERVATIONS

- * THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

| GAUGE LOCATION | GAUGE COORDINATES | | TIME OF MEASURE (UTC) | MAXIMUM TSUNAMI HEIGHT | WAVE PERIOD (MIN) |
|---------------------|-------------------|-------|-----------------------|------------------------|-------------------|
| | LAT | Lon | | | |
| POINT FORTIN TT | 10.2N | 61.4W | 2018 | 1.37M/ 4.5FT | 20 |
| PONTA DELGADA PT | 37.7N | 25.7W | 1956 | 1.70M/ 5.6FT | 18 |
| HORTA | 38.5N | 28.6W | 1947 | 2.77M/ 9.1FT | 28 |
| SANTA MARIA | 36.9N | 25.1W | 1951 | 1.96M/ 6.4FT | 22 |
| MONTAUK NY | 41.0N | 72.0W | 1938 | 0.76M/ 2.5FT | 28 |
| FORTALEZA BR | 3.7S | 38.5W | 1929 | 0.65M/ 2.1FT | 24 |
| PALMEIRA CAPE VERDE | 16.8N | 23.0W | 1924 | 1.72M/ 5.6FT | 14 |
| TELA HN | 15.8N | 87.5W | 1915 | 0.09M/ 0.3FT | 28 |
| KEY WEST FL | 24.6N | 81.8W | 1922 | 0.05M/ 0.2FT | 24 |
| PRAIA CV | 14.9N | 23.5W | 1916 | 0.97M/ 3.2FT | 28 |
| MINDELO CV | 16.9N | 25.0W | 1910 | 1.71M/ 5.6FT | 28 |
| VACA KEY FL | 24.7N | 81.1W | 1900 | 0.05M/ 0.2FT | 16 |
| OREGON INLET NC | 35.8N | 75.5W | 1850 | 0.85M/ 2.8FT | 18 |
| DUCK PIER NC | 36.2N | 75.7W | 1833 | 0.76M/ 2.5FT | 28 |
| PUERTO MORELOS MX | 21.4N | 86.8W | 1831 | 0.07M/ 0.2FT | 26 |
| ISLA MUJERES | 21.2N | 86.7W | 1829 | 0.08M/ 0.3FT | 28 |
| BOCAS DEL TORO PA | 9.4N | 82.3W | 1828 | 0.39M/ 1.3FT | 26 |
| CEIBA CABOTAGE HN | 15.8N | 86.8W | 1828 | 0.08M/ 0.3FT | 22 |
| LIMON CR | 10.0N | 83.2W | 1825 | 0.35M/ 1.1FT | 28 |
| CARRIE BOW CAY BH | 16.8N | 88.1W | 1817 | 0.09M/ 0.3FT | 24 |
| PUERTO CORTES HN | 15.8N | 88.0W | 1811 | 0.09M/ 0.3FT | 20 |
| PUERTO MORELOS MX | 20.9N | 86.9W | 1800 | 0.10M/ 0.3FT | 26 |
| UTILA ISLAND HN | 16.1N | 86.9W | 1757 | 0.09M/ 0.3FT | 20 |
| HATTERAS NC | 35.2N | 75.7W | 1803 | 0.66M/ 2.2FT | 16 |
| SAPZURRO CO | 8.7N | 77.4W | 1758 | 0.40M/ 1.3FT | 20 |
| VIRGINIA KEY FL | 25.7N | 80.2W | 1756 | 0.07M/ 0.2FT | 20 |
| ROATAN ISLAND HN | 16.3N | 86.5W | 1748 | 0.08M/ 0.3FT | 18 |
| EL PORVENIR PA | 9.6N | 78.9W | 1750 | 0.43M/ 1.4FT | 18 |
| SAN ANDRES CO | 12.6N | 81.7W | 1742 | 0.34M/ 1.1FT | 24 |
| ILE ROYAL GUIANA FR | 5.3N | 52.6W | 1741 | 0.74M/ 2.4FT | 18 |
| COVENAS CO | 9.4N | 76.2W | 1743 | 0.42M/ 1.4FT | 28 |
| DART 44402 | 39.3N | 70.7W | 1729 | 0.09M/ 0.3FT | 18 |
| PORT ROYAL JM | 17.9N | 76.8W | 1728 | 0.95M/ 3.1FT | 20 |
| PORT AU PRINCE HT | 18.5N | 72.4W | 1718 | 0.72M/ 2.3FT | 22 |
| DART 44401 | 37.5N | 50.0W | 1710 | 0.15M/ 0.5FT | 26 |
| GEORGE TOWN CY | 19.3N | 81.4W | 1707 | 0.13M/ 0.4FT | 22 |
| SANTA MARTA CO | 11.2N | 74.2W | 1654 | 0.59M/ 1.9FT | 24 |
| PORT OF SPAIN TT | 10.6N | 61.5W | 1641 | 1.16M/ 3.8FT | 28 |
| DART 41424 | 32.9N | 72.5W | 1647 | 0.07M/ 0.2FT | 18 |
| PUERTO ESTRELLA CO | 12.4N | 71.3W | 1635 | 0.85M/ 2.8FT | 14 |
| BERMUDA UK | 32.4N | 64.7W | 1622 | 0.75M/ 2.4FT | 18 |

| | | | | | | |
|---------------------|-------|-------|------|---------|--------|----|
| TORTOLA VI UK | 18.4N | 64.6W | 1612 | 1.68M/ | 5.5FT | 24 |
| PORT SAN ANDRES DO | 18.4N | 69.6W | 1614 | 1.29M/ | 4.2FT | 26 |
| JACMEL HT | 18.2N | 72.5W | 1614 | 0.83M/ | 2.7FT | 22 |
| BULLEN BAY CURACAO | 12.2N | 69.0W | 1607 | 1.55M/ | 5.1FT | 22 |
| BARAHONA DO | 18.2N | 71.1W | 1600 | 0.90M/ | 3.0FT | 26 |
| CAP HAITIEN HT | 19.8N | 72.2W | 1548 | 0.41M/ | 1.3FT | 16 |
| CHARLOTTEVILLE TT | 11.3N | 60.5W | 1541 | 1.29M/ | 4.2FT | 22 |
| SCARBOROUGH TT | 11.2N | 60.7W | 1534 | 1.29M/ | 4.2FT | 26 |
| DART 42407 | 15.3N | 68.2W | 1535 | 0.13M/ | 0.4FT | 22 |
| MAGUEYES ISLAND PR | 18.0N | 67.0W | 1531 | 1.25M/ | 4.1FT | 18 |
| PUERTO PLATA DO | 19.8N | 70.7W | 1535 | 0.57M/ | 1.9FT | 28 |
| PUNTA CANA DO | 18.5N | 68.4W | 1534 | 1.11M/ | 3.6FT | 24 |
| PRICKLEY BAY GD | 12.0N | 61.8W | 1527 | 1.82M/ | 6.0FT | 14 |
| CAJA DE MUERTOS PR | 17.9N | 66.5W | 1531 | 1.50M/ | 4.9FT | 26 |
| LAMESHURBAYSTJOHNVI | 18.3N | 64.7W | 1527 | 1.68M/ | 5.5FT | 28 |
| MONA ISLAND PR | 18.1N | 67.9W | 1525 | 1.01M/ | 3.3FT | 28 |
| SAINT MARTIN FR | 18.1N | 63.1W | 1517 | 2.10M/ | 6.9FT | 22 |
| DART 41420 | 23.5N | 67.3W | 1518 | 0.08M/ | 0.3FT | 16 |
| AGUADILLA PR | 18.5N | 67.2W | 1517 | 0.86M/ | 2.8FT | 28 |
| MAYAGUEZ PR | 18.2N | 67.2W | 1522 | 0.86M/ | 2.8FT | 22 |
| ESPERANZA VIEQUES P | 18.1N | 65.5W | 1513 | 1.47M/ | 4.8FT | 28 |
| ARECIBO PR | 18.5N | 66.7W | 1507 | 0.77M/ | 2.5FT | 16 |
| YABUCOA PR | 18.1N | 65.8W | 1507 | 1.90M/ | 6.2FT | 18 |
| DART 41421 | 23.4N | 63.9W | 1503 | 0.16M/ | 0.5FT | 20 |
| SAN JUAN PR | 18.5N | 66.1W | 1500 | 0.89M/ | 2.9FT | 24 |
| LIMETREE VI | 17.7N | 64.8W | 1506 | 1.19M/ | 3.9FT | 26 |
| CALLIAQUA VC | 13.1N | 61.2W | 1502 | 1.56M/ | 5.1FT | 18 |
| ST CROIX VI | 17.7N | 64.7W | 1502 | 1.19M/ | 3.9FT | 26 |
| BARBUDA AG | 17.6N | 61.8W | 1455 | 4.26M/ | 14.0FT | 26 |
| BRIDGEPORT BB | 13.1N | 59.6W | 1501 | 2.08M/ | 6.8FT | 26 |
| PORT ST CHARLES BB | 13.3N | 59.6W | 1455 | 2.23M/ | 7.3FT | 20 |
| BASSETERRE KN | 17.3N | 62.7W | 1457 | 2.76M/ | 9.1FT | 22 |
| FORT DE FRANCE MQ | 14.6N | 61.1W | 1451 | 2.84M/ | 9.3FT | 22 |
| LE ROBERT MARTINIQU | 14.7N | 60.9W | 1441 | 2.84M/ | 9.3FT | 16 |
| ROSEAU DM | 15.3N | 61.4W | 1442 | 3.23M/ | 10.6FT | 24 |
| LE PRECHEUR MARTINI | 14.8N | 61.2W | 1442 | 2.62M/ | 8.6FT | 14 |
| POINT A PITRE GP | 16.2N | 61.5W | 1439 | 20.10M/ | 65.9FT | 20 |
| DESHAIES GUADELOUPE | 16.3N | 61.8W | 1427 | 6.35M/ | 20.8FT | 24 |
| PARHAM AT | 17.1N | 61.8W | 1430 | 12.98M/ | 42.6FT | 22 |
| DESIRADE GUADELOUPE | 16.3N | 61.1W | 1414 | 14.72M/ | 48.3FT | 16 |

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THE NEXT MESSAGE WILL BE ISSUED IN ONE HOUR... OR SOONER IF THE SITUATION WARRANTS.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.
- * COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S. NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

PTWC Message #9

ZCZC
WECA41 PHEB 212125
TSUCAX

TSUNAMI MESSAGE NUMBER 9
NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI
2125 UTC TUE MAR 21 2017

...FINAL TSUNAMI THREAT MESSAGE...

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

THIS MESSAGE IS ISSUED FOR INFORMATION ONLY IN SUPPORT OF THE UNESCO/IOC TSUNAMI AND OTHER COASTAL HAZARDS WARNING SYSTEM FOR THE CARIBBEAN AND ADJACENT REGIONS AND IS MEANT FOR NATIONAL AUTHORITIES IN EACH COUNTRY OF THAT SYSTEM.

NATIONAL AUTHORITIES WILL DETERMINE THE APPROPRIATE LEVEL OF ALERT FOR EACH COUNTRY AND MAY ISSUE ADDITIONAL OR MORE REFINED INFORMATION.

**** NOTICE **** NOTICE **** NOTICE **** NOTICE **** NOTICE ****

PRELIMINARY EARTHQUAKE PARAMETERS

* MAGNITUDE 8.5
* ORIGIN TIME 1400 UTC MAR 21 2017
* COORDINATES 17.0 NORTH 60.7 WEST
* DEPTH 40 KM / 25 MILES
* LOCATION LEEWARD ISLANDS

EVALUATION

- * AN EARTHQUAKE WITH A PRELIMINARY MAGNITUDE OF 8.5 OCCURRED IN THE LEEWARD ISLANDS AT 1400 UTC ON TUESDAY MARCH 21 2017.
- * BASED ON ALL AVAILABLE DATA... THE TSUNAMI THREAT FROM THIS EARTHQUAKE HAS PASSED AND THERE IS NO FURTHER THREAT.

TSUNAMI THREAT FORECAST...UPDATED

- * THE TSUNAMI THREAT HAS NOW LARGELY PASSED.

RECOMMENDED ACTIONS

- * GOVERNMENT AGENCIES RESPONSIBLE FOR ANY IMPACTED COASTAL AREAS SHOULD MONITOR CONDITIONS AT THE COAST TO DETERMINE IF AND WHEN IT IS SAFE TO RESUME NORMAL ACTIVITIES.
- * PERSONS LOCATED NEAR IMPACTED COASTAL AREAS SHOULD STAY ALERT FOR INFORMATION AND FOLLOW INSTRUCTIONS FROM LOCAL AUTHORITIES.
- * REMAIN OBSERVANT AND EXERCISE NORMAL CAUTION NEAR THE SEA.

POTENTIAL IMPACTS

- * MINOR SEA LEVEL FLUCTUATIONS UP TO 30 CM ABOVE AND BELOW THE NORMAL TIDE MAY OCCUR IN COASTAL AREAS NEAR THE EARTHQUAKE OVER THE NEXT FEW HOURS.... AND CONTINUING FOR UP TO SEVERAL HOURS.

NEXT UPDATE AND ADDITIONAL INFORMATION

- * THIS WILL BE THE FINAL STATEMENT ISSUED FOR THIS EVENT UNLESS NEW INFORMATION IS RECEIVED OR THE SITUATION CHANGES.
- * AUTHORITATIVE INFORMATION ABOUT THE EARTHQUAKE FROM THE U.S. GEOLOGICAL SURVEY CAN BE FOUND ON THE INTERNET AT EARTHQUAKE.USGS.GOV/EARTHQUAKES -ALL IN LOWERCASE LETTERS-.
- * FURTHER INFORMATION ABOUT THIS EVENT MAY BE FOUND AT PTWC.WEATHER.GOV AND AT WWW.TSUNAMI.GOV.
- * COASTAL REGIONS OF PUERTO RICO... THE U.S. VIRGIN ISLANDS... AND THE BRITISH VIRGIN ISLANDS SHOULD REFER TO PACIFIC TSUNAMI WARNING CENTER MESSAGES SPECIFICALLY FOR THOSE

PLACES THAT CAN BE FOUND AT PTWC.WEATHER.GOV.

* COASTAL REGIONS OF THE US GULF COAST... US EAST COAST... AND
THE MARITIME PROVINCES OF CANADA SHOULD REFER TO U.S.
NATIONAL TSUNAMI WARNING CENTER MESSAGES THAT CAN BE FOUND
AT NTWC.ARH.NOAA.GOV.

\$\$

NNNN

Exercise

Annex G. 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)

CARIBBEAN TSUNAMI EXERCISE TO BE CONDUCTED March 21, 2017

(insert community/county/state name) will join other localities in the Caribbean as a participant in a tsunami response exercise on March 21, 2017. 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 2010, 2014, 2015 Chilean 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 17, will simulate a widespread Tsunami Warning and Watch situation throughout the Caribbean, which requires implementation of local tsunami response, plans. The exercise will *(insert “include” or “not include”)* public notification.

The exercise will simulate a major earthquake and tsunami generated *(insert description of chosen escenario - source and appropriate local time)* on March 21, 2017. A handbook has been prepared which describes the scenario and contains tsunami messages from the Pacific Tsunami Warning Center (PTWC). The PTWC is the interim Regional Tsunami Service 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), and the U.S. National Oceanic and Atmospheric Administration (NOAA).

For more information on the U.S. tsunami warning system, see www.tsunami.gov.

For more information on the ICG/CARIBE-EWS, see http://ioc-tsunami.org/index.php?option=com_oe&task=viewEventRecord&eventID=1912.

###

On the Web:

ICG/CARIBE EWS

<http://www.ioc-tsunami.org>

Pacific Tsunami Warning Center

<http://ptwc.weather.gov>

NOAA Tsunami Program

<http://www.tsunami.gov>

Caribbean Tsunami Warning Program

<http://caribewave.info>

Insert state/local emergency response URLs