

Caribe Wave 11 and LANTEX 2011

A Caribbean Tsunami Warning Exercise

**NOAA NWS Caribbean Tsunami Warning Program
Mayagüez, Puerto Rico
January 18, 2010**

**Christa G. von Hillebrandt-Andrade
Manager**

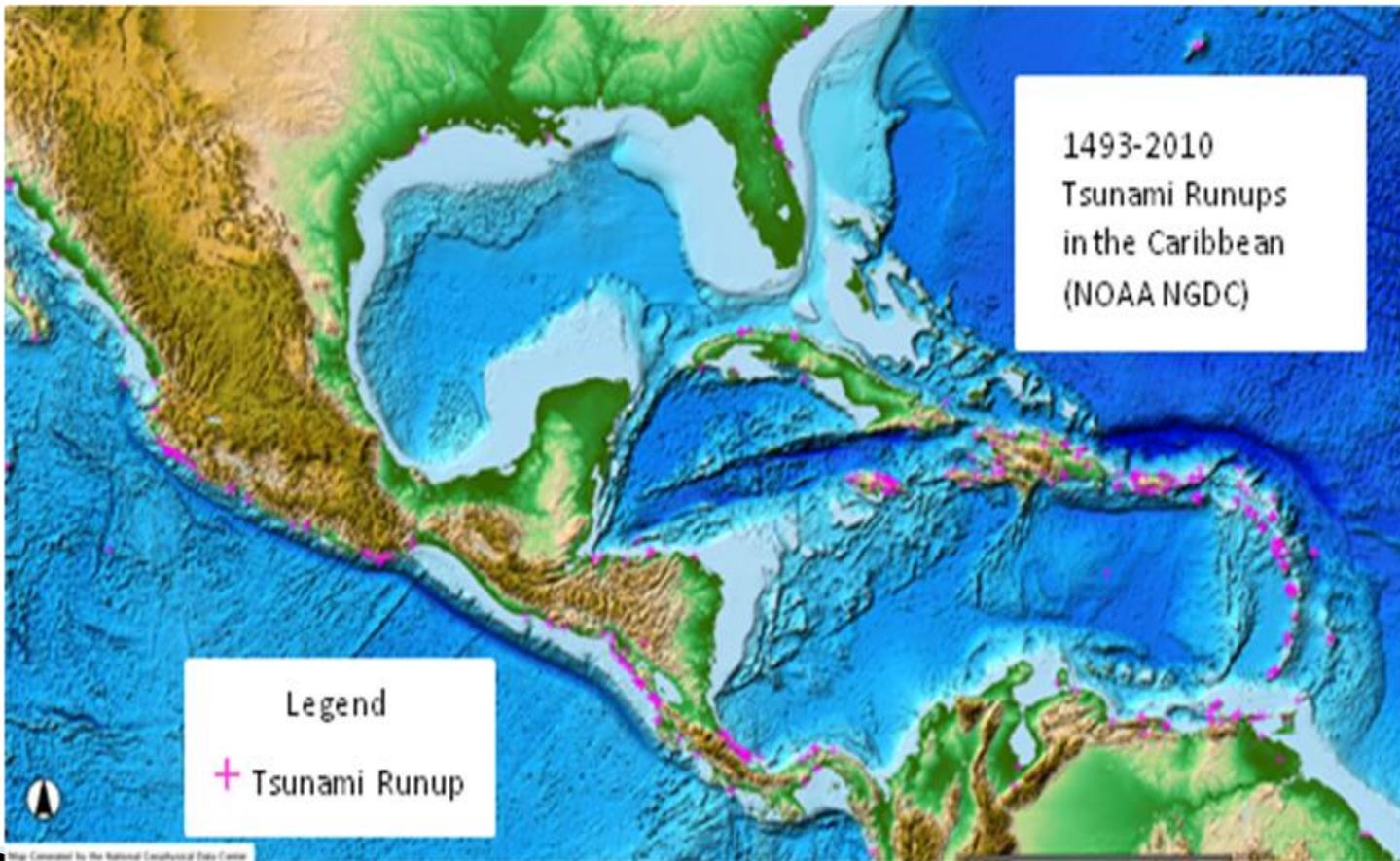
Outline

- ▶ Introduction and overview of Exercise
- ▶ Earthquake and Tsunami Scenario
- ▶ Messages associated with the exercise
 - WCATWC
 - PTWC
- ▶ Type of Exercise to be conducted at the National/Local level
- ▶ Media
- ▶ Special Provisions
- ▶ Contacts
- ▶ Post-Exercise Evaluation
- ▶ Next Webinars

Exercise Manual

- ▶ The exercise manual and circular letter from IOC is available in Spanish, English and French.
- ▶ Available at:
 - http://www.ioc-tsunami.org/index.php?option=com_oe&task=viewDoclistRecord&doclistID=102&lang=en (IOC CARIBE EWS website)
 - <http://www.srh.noaa.gov/srh/ctwp/?n=caribwave2011> (Caribbean Tsunami Warning Program website)
- ▶ NTHMP version of the Manual:
 - <http://wcatwc.arh.noaa.gov/>

Justification for Exercise: The Caribbean has a history of over more than 75 tsunamis in the past 500 years (page 1)



Institutional Framework for the Exercise (page 3)

- ▶ The United National Educational, Scientific, and Cultural Organization's (UNESCO) Intergovernmental Coordination Group for Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS)
- ▶ Caribbean Emergency Management Agency (CDEMA)
- ▶ Centro de Coordinación para la Prevención de los Desastres Naturales en América Central (CEPREDENAC)
- ▶ NOAA, National Weather Service, U.S. National Tsunami Hazard Mitigation Program (NTHMP) and Caribbean Tsunami Warning Program (CTWP)

Purpose of the Exercise (page 3)

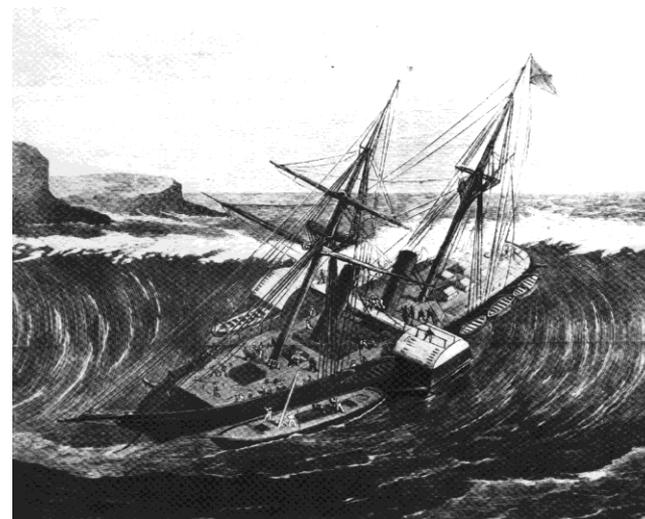
- ▶ Improve Tsunami Warning System effectiveness along Caribbean and Gulf coasts and along the Eastern and Gulf Coast of the US and the Eastern Coast of Canada.
- ▶ Opportunity for the emergency management and response system to:
 - Exercise operational lines of communications
 - Review tsunami response operation procedures (SOP)
 - Promote tsunami preparedness

Objectives of the Exercise (page 3)

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

Scenario (page 5, 17)

- ▶ The scenario is based on the November 18, 1867 earthquake and tsunami for which wave heights of up to 10 meters were reported in the Eastern Caribbean.



Tsunami amplitudes from 1867

Island	Site	Maximum positive amplitude, m
Puerto Rico	San Juan	0.9
Puerto Rico	Yabucoa Harbor	2.0
Puerto Rico	Arroyo (near Guayama)	1.5
Vieques, Puerto Rico		high waves
British Virgin Islands, Tortola	Road Town	1.5
British Virgin Islands, Peter Island		1.5
US Virgin Islands, Saint Thomas	Charlotte Amalie	6.0
US Virgin Islands, Hassel Island		4.9
US Virgin Islands, Saint Croix	Fredericksted	7.6
Saba Island, Netherlands Antilles		high wave
St. Kitts		sea rose high
Antigua	St. John's	3.0
Guadeloupe	Deshaies	10.0
Guadeloupe	Sainte Rose	10.0
Guadeloupe	Basse Terre	2.0
Guadeloupe, Isles des Saintes		1.0
Grenadines, Bequia Island	Port Elizabeth	1.8
Grenada	Gouyave	3.0
Grenada	Saint George's	1.5
Isle de Margarita, Venezuela		reported

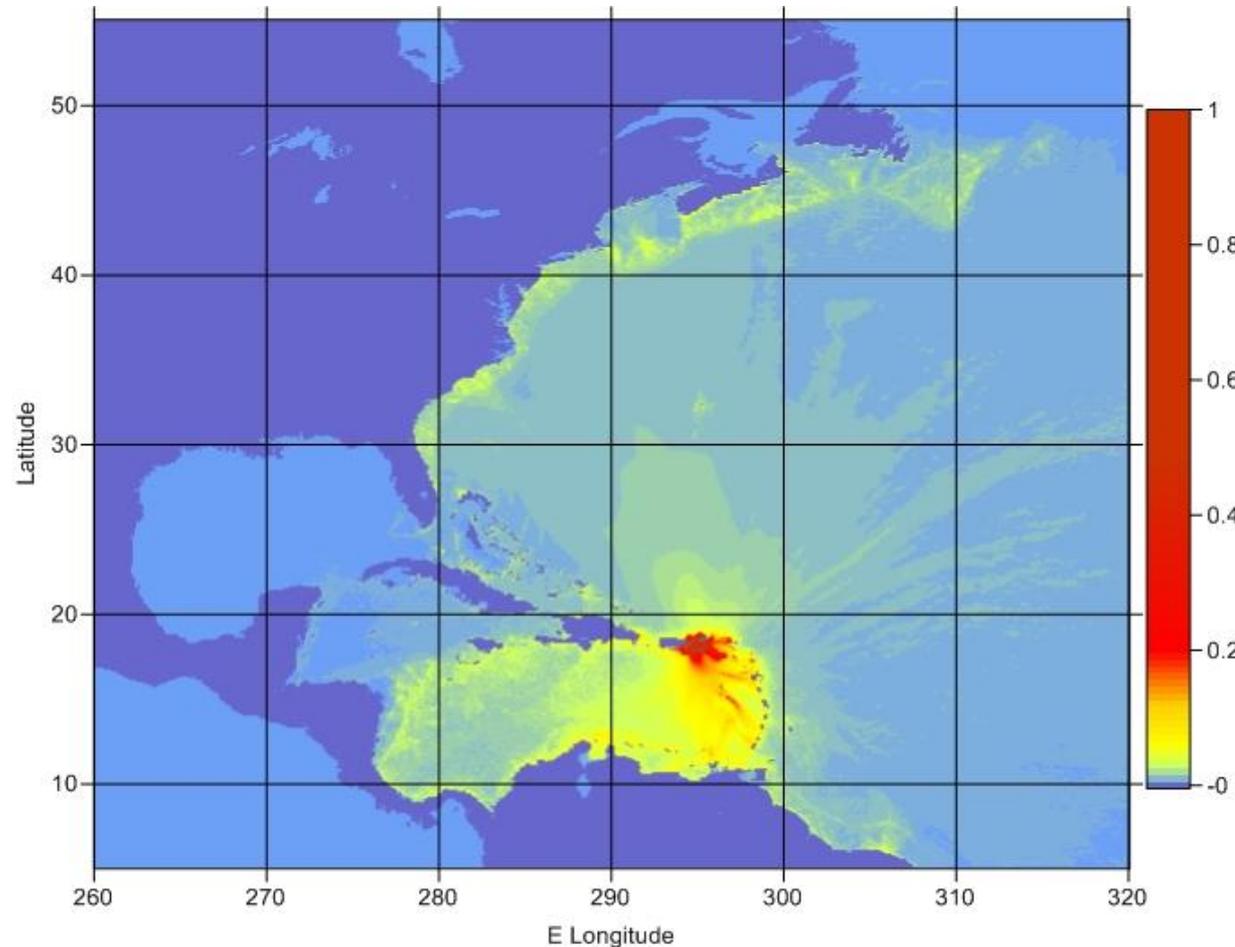
(Zahibo et al, 2003 after Reid and Taber, 1920)

Exercise Scenario–Earthquake

- ▶ Date: Wednesday, March 23, 2011
- ▶ Source 1
 - Time: 1300 UTC
 - Earthquake Magnitude: 7.6
 - Epicenter: 18.21N, 65.26W
 - Depth: 7 km
- ▶ Source 2
 - Time: 1305 UTC,
 - Magnitude: 7.6
 - Epicenter: 18.36N, 64.73W
 - Depth: 7 km

Exercise Scenario–Tsunami

- ▶ Maximum modeled offshore wave height 4.7 m
- ▶ The height of the wave on the shore could be double that of the model outputs.
- ▶ Travel time first wave: 1 min – 5 hours



Travel Times and Max. Amp (offshore), Leading Edge (page 17)

Location	Travel time (hr:min)	Max Amp. (meters)	Leading Edge
Charlotte Amalie, VI	0:01	2.7	elevation
Christiansted, VI	0:01	2.5	recession
Fajardo, PR	0:01	0.95	recession
Lameshur Bay, VI	0:02	2.85	recession
Limetree Bay, VI	0:02	4.7	recession
Virgin Gorda, BVI	0:03	1.4	recession
Culebra, PR	0:05	2.0	elevation
St. John, VI	0:07	0.26	elevation
Tortola, BVI	0:07	0.47	elevation
San Juan, PR	0:12	0.59	elevation
Mona Island, PR	0:25	0.26	recession
Maguëyes Island, PR	0:28	0.75	recession
D42407	0:32	.025	recession
Aquadilla, PR	0:36	0.50	recession
Saint Kitts	0:44	1.07	recession
Anguilla	0:45	1.23	
Montserrat	0:45	0.18	recession
Mayaguez, PR	0:47	0.50	recession
Basse Terre, Guadalupe	0:51	0.19	recession
Cabo Engano, DR	0:54	0.12	recession
Barbuda	0:55	0.13	recession
Bonaire	0:55	0.07	recession

Location	Travel time (hr:min)	Max Amp. (meters)	Leading Edge
Roseau, Dominica	0:55	0.23	recession
Saint Maarten,	1:01	0.25	recession
Santo Domingo	1:02	0.18	
Fort-de-France, Martinique	1:03	0.21	recession
St Johns, Antigua	1:03	0.24	recession
Saint Lucia	1:05	0.11	recession
Saint Vincent	1:14	0.78	recession
Curacao	1:11	0.27	recession
Aruba	1:16	0.13	recession
Grand Turk, Turks and Caicos	1:18	0.05	
St. Georges, Grenada	1:24	0.54	recession
Maiquetia, VE	1:30	0.12	recession
Puerto Plata, DR	1:30	0.04	elevation
La Guaira, VE	1:31	0.15	recession
Bridgetown, Barbados	1:38	0.05	recession
Santa Marta, CO	1:57	0.095	recession
Barranquilla, CO	2:01	0.11	recession
Bermuda	2:05	0.09	repression
Cumana, VE	2:05	0.14	elevation
Cartagena, CO	2:18	0.02	recession
Kingston, JA	2:26	0.08	recession
Porlamar, VE	2:29	0.26	
Gibara, Cuba	3:08	0.02	
Puerto Limon, CR	3:11	0.04	recession

Location	Travel time (hr:min)	Max Amp. (meters)	Leading Edge
<u>Riohacha, CO</u>	3:18	0.10	recession
Punta Fijo, VE	3:42	0.085	elevation
Port Au Prince, Haiti	3:57	0.04	recession
Guantanamo Bay, Cuba	3:58	0.035	elevation
<u>Golfo de Venezuela, VE</u>	4:20	0.02	recession
<u>Porlamar, VE</u>	4:21	0.04	elevation
Montego Bay, JA	4:35	~0.01	?
Georgetown, Guyana	5:12	0.04	
Port-O-Spain	5:24	~0.01	recession

Scenario and Message Timeline (page 8)

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

The initial dummy message will be disseminated over all standard TWC broadcast channels. This is being issued to test communications with EMOs and Tsunami Warning Focal Points, and to start the exercise. **All messages will be disseminated over a special email list to provide the messages in real time to organizations requesting this service. To request this service, please contact Christa von Hillebrandt (christa.vonh@noaa.gov)**

Product Types Issued for Dummy Message with Transmission Methods

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

NWWS
GTS
EMWIN

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

Tsunami Messages (page 6)

West Coast & Tsunami Warning Center
<http://www.nwr.noaa.gov>
Puerto Rico Seismic Network
<http://tudisimio.usps.edu> Telephone: 787-632-8632
TSUNAMI MESSAGES



- Danger!
- Run for high ground!
- Follow emergency instructions.

WARNING



ADVISORY

- Possible strong and dangerous local currents.
- Get out of the water and off the beach.
- Stay tuned for local emergency guidance.



- Potential danger.
- Stayed tuned for more information.

WATCH



- Relax.
- No danger.
- A distant ocean basin may be in danger.

INFORMATION STATEMENT

WEST COAST & ALASKA TSUNAMI WARNING CENTER

Pacific Tsunami Warning Center
<http://www.weather.gov/ptwc/index.php>
Caribbean Tsunami Warning Program
<http://www.srh.noaa.gov/srh/ctwp>
TSUNAMI MESSAGES FOR THE CARIBBEAN EXCEPT FOR PUERTO RICO AND THE US VIRGIN ISLANDS





- Danger for all coasts within the Caribbean Region!
- Run for High Ground!
- Follow the instructions of the emergency management officials.

CARIBBEAN SEA WIDE TSUNAMI WATCH



- Danger for coasts within a thousand kilometers from Earthquake!
- Run for High Ground!
- Follow the instructions of the emergency management officials.

REGIONAL TSUNAMI WATCH



- Danger for coasts within a hundred kilometers from Earthquake!
- Run for High Ground!
- Follow the instructions of the emergency management officials.

LOCAL TSUNAMI WATCH



- Relax.
- No Danger.
- A more distant place may be in danger.

INFORMATION STATEMENT

Examples, excerpts from exercise messages (Page 21–44)

Dummy Message–WCATWC

WEXX20 PAAQ 231302
TSUAT1

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

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

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

THIS IS ONLY AN EXERCISE.

\$\$

Dummy Message PTWC

WECA41 PHEB 231302
TSUCAX

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

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

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

THIS IS ONLY AN EXERCISE.

\$\$

WCATWC Message #1

WEXX20 PAAQ 231302
TSUAT1

BULLETIN

TSUNAMI MESSAGE NUMBER 1

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

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

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

WCATWC Message #1 (cont)

RECOMMENDED ACTIONS

PERSONS IN LOW-LYING COASTAL AREAS SHOULD BE ALERT TO INSTRUCTIONS FROM THEIR LOCAL EMERGENCY OFFICIALS. EVACUATIONS ARE ONLY ORDERED BY EMERGENCY RESPONSE AGENCIES.

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

PRELIMINARY EARTHQUAKE PARAMETERS

MAGNITUDE – 7.6

TIME – 0900 EDT MAR 23 2011

0900 AST MAR 23 2011

0800 CDT MAR 23 2011

1300 UTC MAR 23 2011

LOCATION – 18.2 NORTH 65.3 WEST

25 MILES/40 KM SE OF FAJARDO PUERTO RICO

60 MILES/97 KM SE OF SAN JUAN PUERTO RICO

DEPTH – 56 MILES/90 KM

WCATWC Message #1 (cont)

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

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

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

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

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

WCATWC Message #1 (cont)

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

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

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

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

\$\$

PTWC Message #1

WECA41 PHEB 231302
TSUCAX

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

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

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

PTWC Message #1 (cont)

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

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

PRELIMINARY EARTHQUAKE PARAMETERS

MAGNITUDE – 7.6

TIME – 1300 UTC MAR 23 2011

LOCATION – 18.2 NORTH 65.3 WEST

25 MILES/40 KM SE OF FAJARDO PUERTO RICO

55 MILES/89 KM SE OF SAN JUAN PUERTO RICO

DEPTH – 56 MILES/90 KM

PTWC Message #1 (cont)

EVALUATION

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

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

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

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

PTWC Message #1 (cont)

Exercise

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

PTWC Message #1 (cont)

Exercise

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

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

PTWC Message #2 Special Information

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

WCATWC Message #4 Special Information

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

PTWC Message #3 Special Information

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

WCATWC Cancellation Message

1701 UTC (1:01 PM AST)

WEXX20 PAAQ 231701
TSUAT1

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

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

EVALUATION

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

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

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

PRELIMINARY EARTHQUAKE PARAMETERS

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

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

WCATWC Cancellation Message (cont)

Exercise

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

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

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

\$\$

PTWC Message #6 Cancellation: 1802 UTC

Exercise

WECA41 PHEB 231802
TSUCAX

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

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

... THE TSUNAMI WATCH IS CANCELLED ...

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

PRELIMINARY EARTHQUAKE PARAMETERS

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

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

PTWC Message #6 Cancellation (cont)

EVALUATION

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

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

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

Exercise

**Decide what type of
exercise will be conducted
in your jurisdiction**

(pages 3, 13)

Types of Exercises (pages 4, 13)

▶ Orientation Exercise (Seminar)

- An Orientation Exercise
- 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.
- Planning Period: 2 weeks
- Duration: Several Hours/Full Day

▶ Drill

- Tests, develops, and/or maintains skills in a single or limited emergency response procedure.
- Generally involve operational response of single departments or agencies.
- Can involve internal notifications and/or field activities.
- Planning Period: 2 weeks
- Duration: Full Day

Types of Exercises (cont.)

▶ **Tabletop Exercise**

- Local officials, key staff, and organizations with disaster management responsibilities are presented with simulated emergency situations.
- Conference room environment,
- Participants will examine and attempt to resolve problems, based on plans and procedures
- 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 (Appendix A for a Sample Tabletop Exercise Outline).
- Planning Period: 2 weeks
- Duration: 1–3 days

Types of Exercises (cont.)

▶ **Functional Exercise**

- Test and evaluate organizational capacities.
- Evaluate the capability of a community's emergency management system by testing the Emergency Standard Operations Procedures (SOP's)
- Fully simulated experience of being in a major disaster event
- Activate all the appropriate members designated by the plan.
- 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.
- Planning Period: 1–2 months
- Duration 1–5 days

Types of Exercises (cont.)

▶ **Full-scale Exercise:**

- Encompasses a majority of the emergency management functions.
- 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.
- It may or may not include public evacuations.
- Planning Period: 2–6 months
- Duration: 1 day/week

Media (page 10, 51)

- ▶ Communities may wish to invite their local media to the exercise to promote local awareness of the tsunami hazard. Appendix F contains a sample press release which can be adapted as necessary.
- ▶ NOAA will issue a press release several days before the exercise describing the exercise and its purpose.

Special Provisions (page 9)

- ▶ **In the case of a real event**
 - TWCs will issue their normal messages for the event. Such messages will be given full priority and a decision will be made by the TWCs whether to issue the dummy message and to send email messages to selected recipients. Smaller earthquakes that only trigger a Tsunami Information Statement will not disrupt the exercise. All documentation and correspondence relating to this exercise is to be clearly identified as “**CARIBE WAVE 11 /LANTEX 11**” and “**Exercise.**”
- ▶ **Procedure for false alarm**
 - Procedures should be set up by all participating entities to address public or media concerns involving this exercise in case of mis-interpretation by media or the public.
 - NOTE: Very important to mark all documents with EXERCISE

For questions, please contact (page 9)

<u>Person</u>	<u>Telephone #</u>	<u>Email</u>
Loma Inniss, Chair	246-228-5950	linniss@coastal.gov.bb
Francisco Garces, Vice Chair	58-212-2575153	fgarces@funvisis.gob.ve
Frederique Martini, Vice Chair	Frederique.MARTINI@developpement-durable.gouv.fr	
Christa von Hillebrandt, Vice Chair; NWS CTWP Manager	787-833-8433	christa.vonh@noaa.gov
Emilio Talavera, Chair WG1	505-22492761	emilio.talavera@gf.ineter.gob.ni
Aurelio Mercado, Chair WG2	787-265-5461	aurelio.mercado@upr.edu
Rafael Mojica, Chair WG3	787-253-4586	rafael.mojica@noaa.gov
Dimas Alonso, Chair WG4	504-2290606 x401	alonzoaguadesastres@yahoo.com
Bernardo Aliaga, Technical Secretary	33-1-45683980	b.aliaga@unesco.org
Jeremy Collymore, Ex. Director CDEMA	246-425-0386	Jeremy.Collymore@cdema.org
Walter Wintzer, CEPREDENAC	502-2362-1981-83	wwintzer@sica.int
Ivan Morales, CEPREDENAC	502-2362-1981-83	imorales@sica.int
Melinda Bailey, NWS Southern Region	817-978-1100x107	melinda.bailey@noaa.gov
Wilfredo Ramos, PREMA Rep.	787-724-0124	wramos@aemead.gobierno.pr
Jacqueline Heyliger VITEMA Rep.	340-773-2244	jjheylinger@yahoo.com
Paul Whitmore WCATWC Director	907-745-4212	paul.whitmore@noaa.gov
Bill Knight WCATWC TWSO	907-745-4212	william.knight@noaa.gov
James Waddell WCATWC Rep.	907-745-4212	james.waddell@noaa.gov
Charles McCreery PTWC Director	808-689-8207	charles.mccreery@noaa.gov
Stuart Weinstein PTWC TWSO	808-689-8207	stuart.weinstein@noaa.gov
Gerard Fryer PTWC Rep.	808-689-8207	gerard.fryer@noaa.gov
Victor Huerfano PRSN Director	787-833-8433	victor@prsn.uprm.edu

Post-Exercise Evaluation (page 10)

- ▶ An online questionnaire will be available for the participants to provide feedback on the exercise
- ▶ Deadline for feedback: April 11, 2011
- ▶ Results of the exercise will be presented at Session VI of the ICG CARIBE EWS to be held in the Dominican Republic April 26–29, 2011

Next Webinars

- ▶ January 20, 2011 (Spanish) at 12:00 PM – 1:00 PM CST. Reserve your Webinar seat for this date/time now at:
<https://www1.gotomeeting.com/register/506701465>
- ▶ March 1, 2011 (English) at 12:00 PM – 1:00 PM CST. Reserve your Webinar seat for this date/time now at:
<https://www1.gotomeeting.com/register/822696993>
- ▶ March 3, 2011 (Spanish) at 12:00 PM – 1:00 PM CST. Reserve your Webinar seat for this date/time now at:
<https://www1.gotomeeting.com/register/700124201>

Questions

Thank you very much

- ▶ For updates on the exercise please refer to:
<http://www.srh.noaa.gov/srh/ctwp/?n=caribwave2011>
- ▶ For past experiences in the region with tsunami warning exercises
 - Puerto Rico Seismic Network –
<http://redsismica.uprm.edu/Spanish/informacion/antex10.php>
 - British Virgin Islands Department of Disaster Management
<http://www.bviddm.com/index.php>