CaribeWave and LANTEX 2011

A Caribbean Tsunami Warning Exercise

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

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Manager

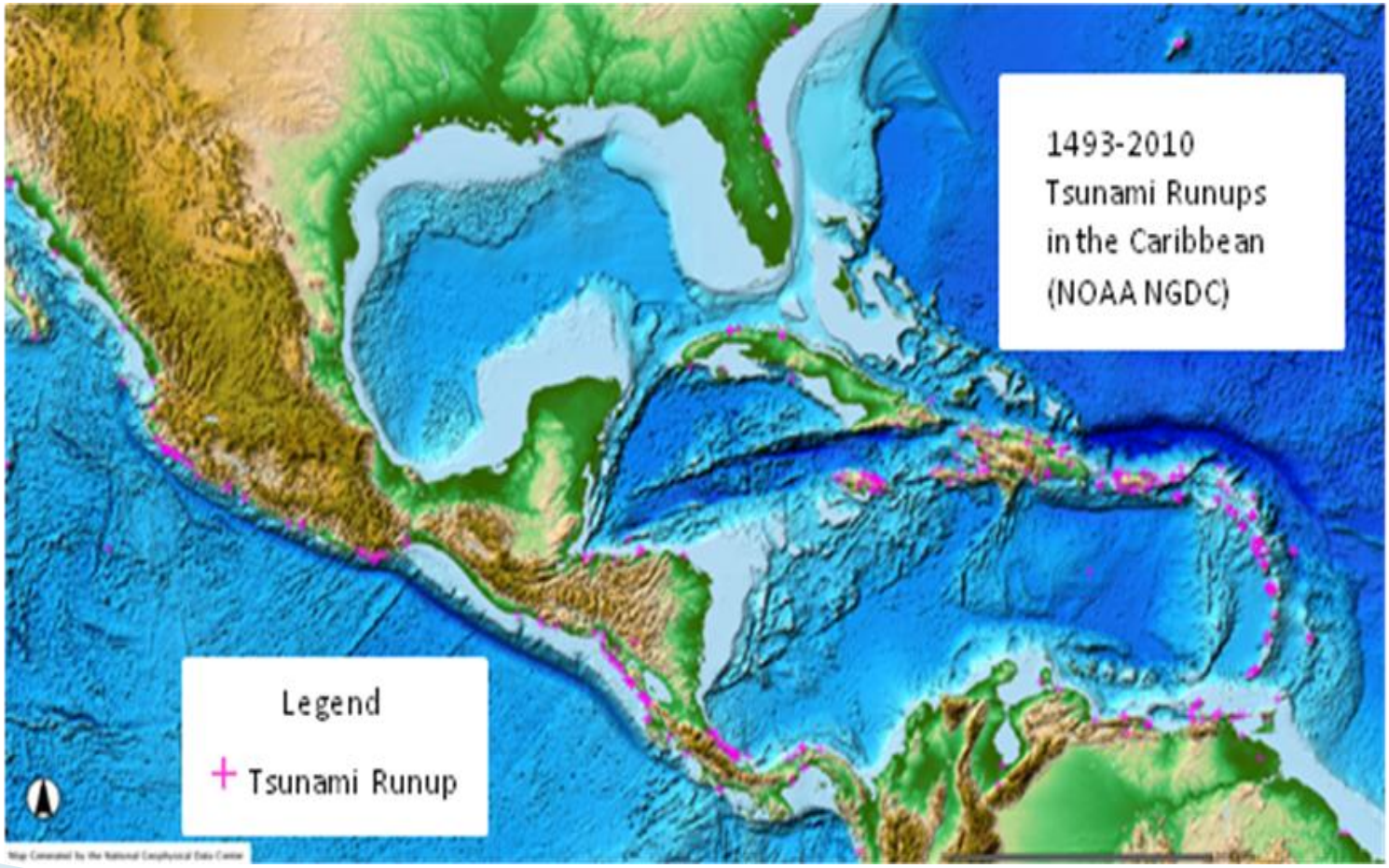
Institutional Framework for the Exercise

- 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

- Improve Tsunami Warning System effectiveness along Caribbean 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

Recall that the Caribbean has a more than 500 year history of Tsunamis



Exercise Manual

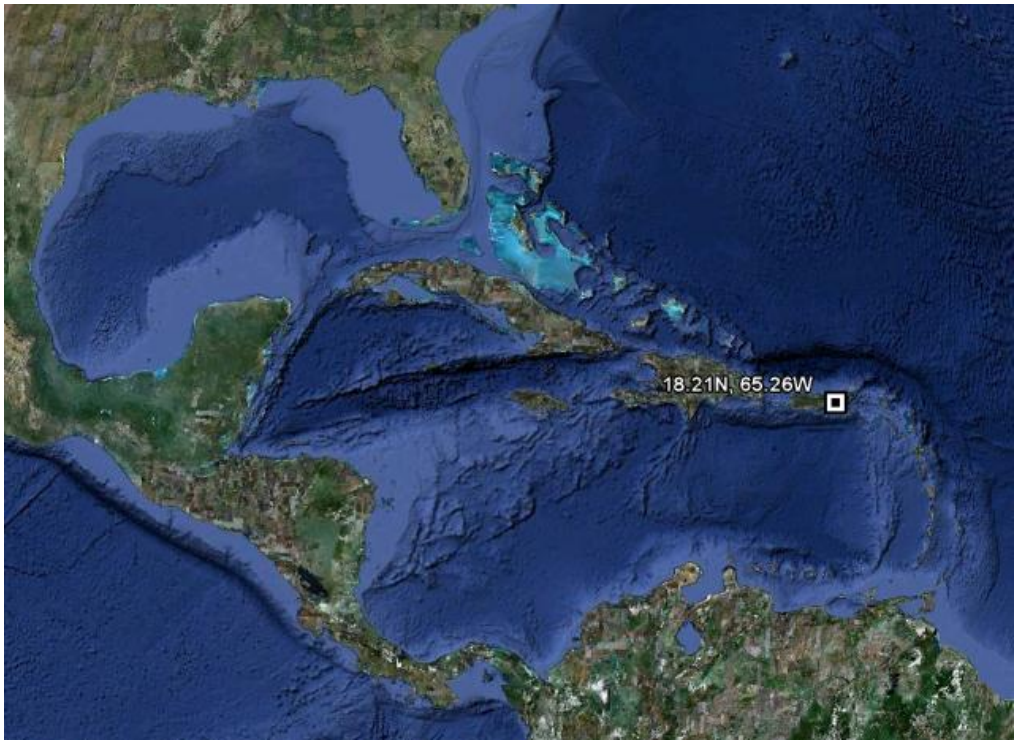
- The exercise manual and circular letter from IOC is available in Spanish, English and French.
- Available at:
  - http://www.ioc-tsunami.org/index.php?option=com_oe&task=viewDoclistRecord&doclistID=102&lang=en (IOC CARIBE EWS website)
  - http://www.srh.noaa.gov/srh/ctwp/?n=caribwave2011 (Caribbean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

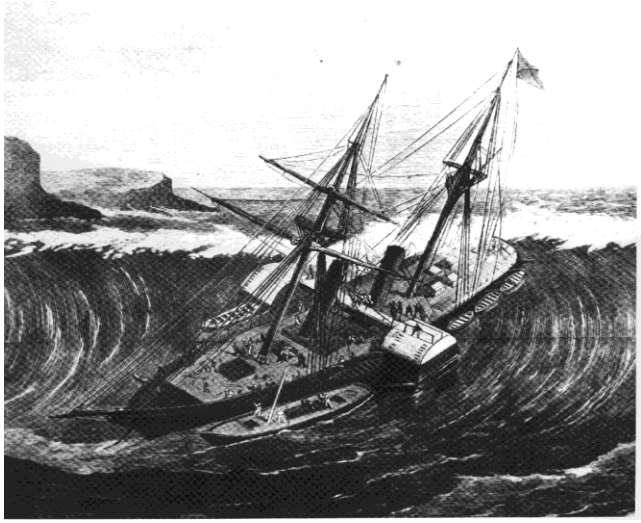
Objectives of the Exercise

- 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

- The scenario 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

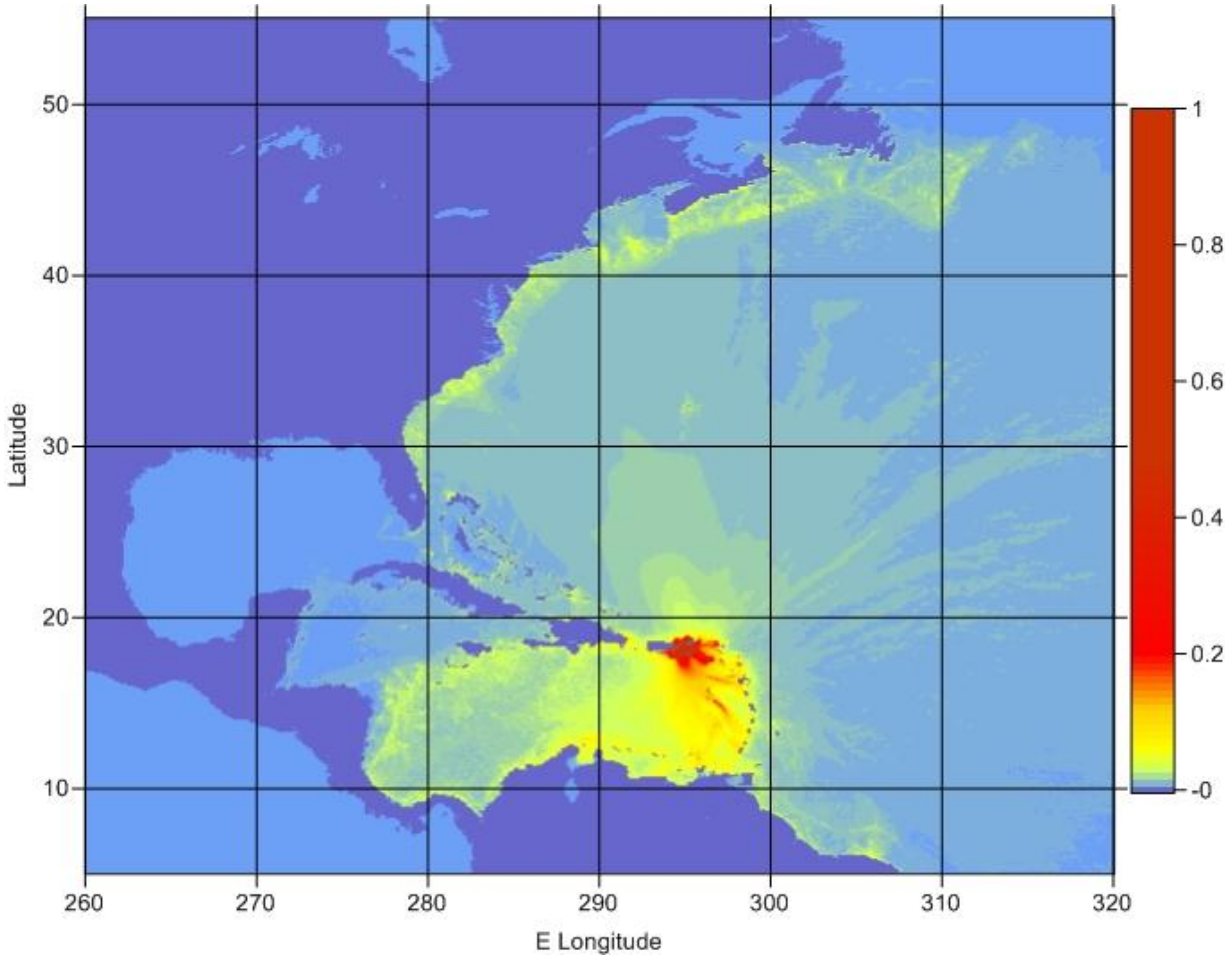
(Zahibo et al, 2003 after Reid and Taber, 1

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: 1min – 4 hours



Scenario Timeline

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

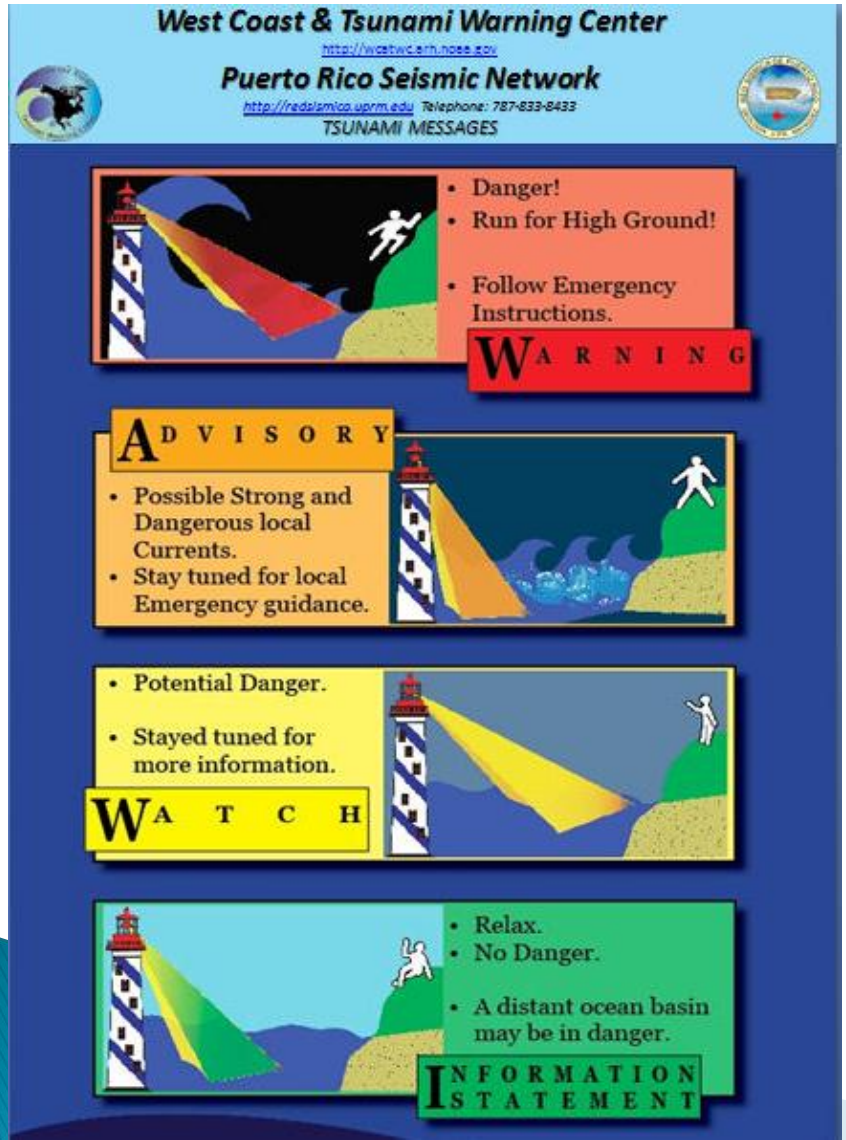
The initial dummy message will be disseminated over all standard TWC broadcast channels. This is being issued to test communications with EMOs and Tsunami Warning Focal Points, and to start the exercise. All messages will be disseminated over a special email list to provide the messages in real time 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 NOAA Weather Wire Service
GTS Global Telecommunications System
EMWIN Emergency Manager's Weather Information Network

Tsunami Messages



Examples, excerpts from exercise messages

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.

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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.

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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

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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)

LOCATION		COORDINATES		ARRIVAL TIM
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)

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. ROHLSEN AIRPORT REPORTS FLOODING ON THE RUNWAY AND IS CURRENTLY NOT OPERATING. COMMUNICATIONS WITH COUNTRIES IN THE NORTHEASTERN CARIBBEAN IS VERY SPORADIC AND DAMAGE AND INUNDATION REPORTS ARE NOW JUST COMING IN.

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)

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WEXX20 PAAQ 231701
TSUAT1

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

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

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

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

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

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

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

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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.

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COASTAL AREAS OF PUERTO RICO AND THE VIRGIN ISLANDS.
101 PM AST WED MAR 23 2011

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

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PTWC Message #6 Cancellation: 1802 UTC

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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.
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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.

Decide what type of exercise will be conducted in your jurisdiction

Types of Exercises

- **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: 1day/week

Media

- 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

- **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.

For questions, please contact

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Post-Exercise Evaluation

- 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

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/lantex10.php
  - British Virgin Islands Department of Disaster Management

  http://www.bviddm.com/index.php