



Caribbean Tsunami Warning System

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With input from

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NOAA NWS Caribbean Tsunami Warning Program

And

Bill Proenza

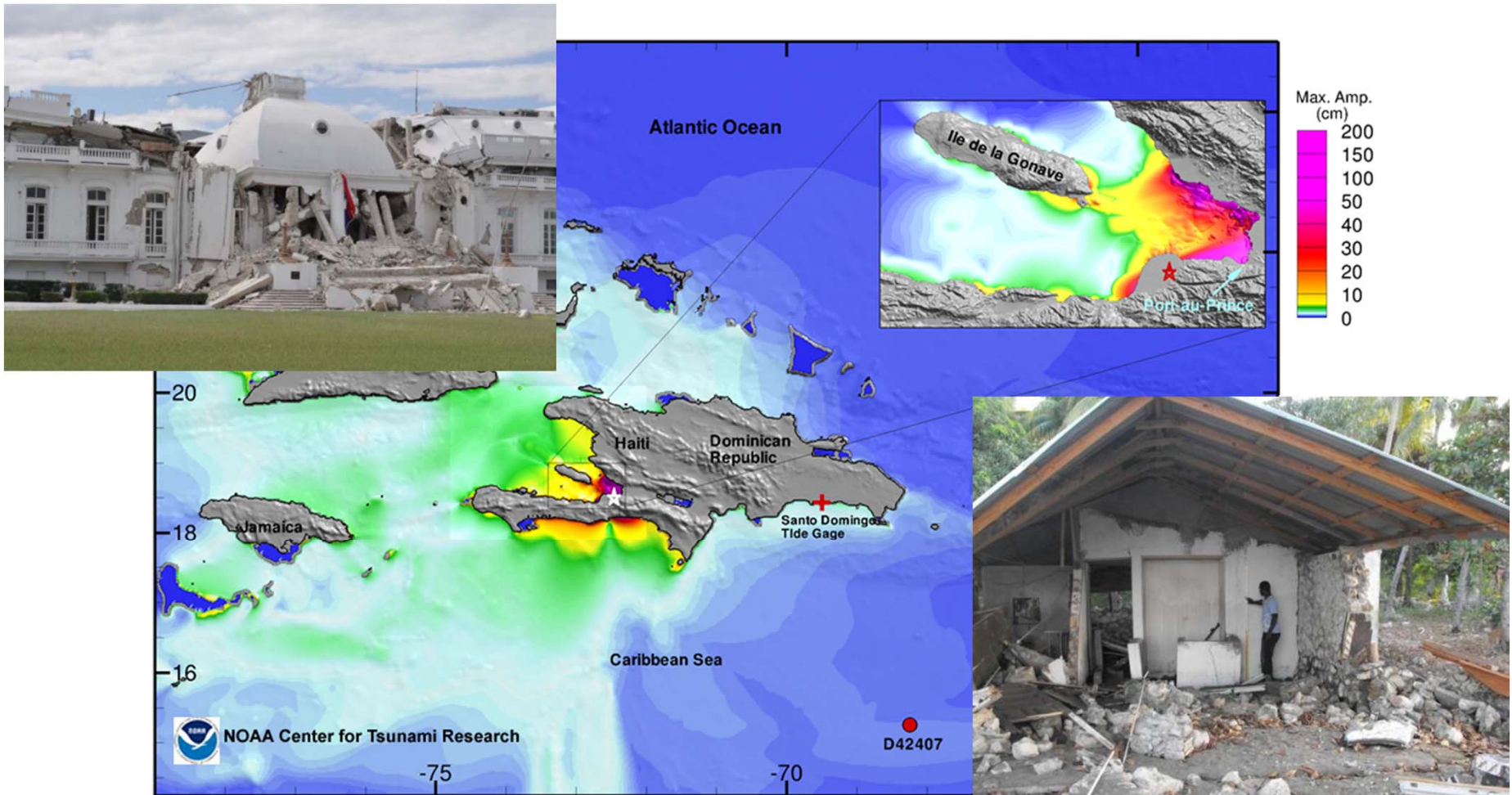
NOAA NWS Southern Region Headquarters

WMO DRR Workshop Ritz Carlton, Grand Cayman

March 7, 2011

Haiti Earthquake and Tsunami

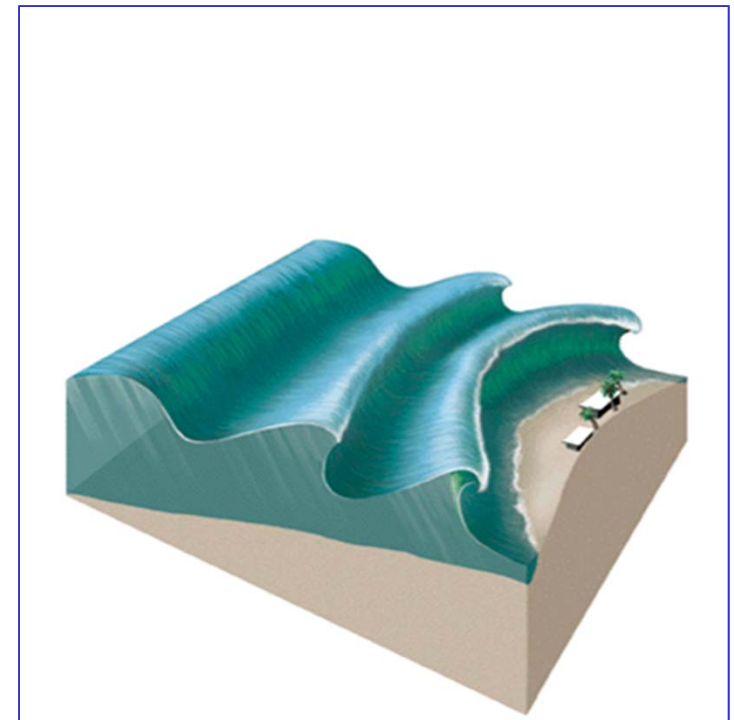
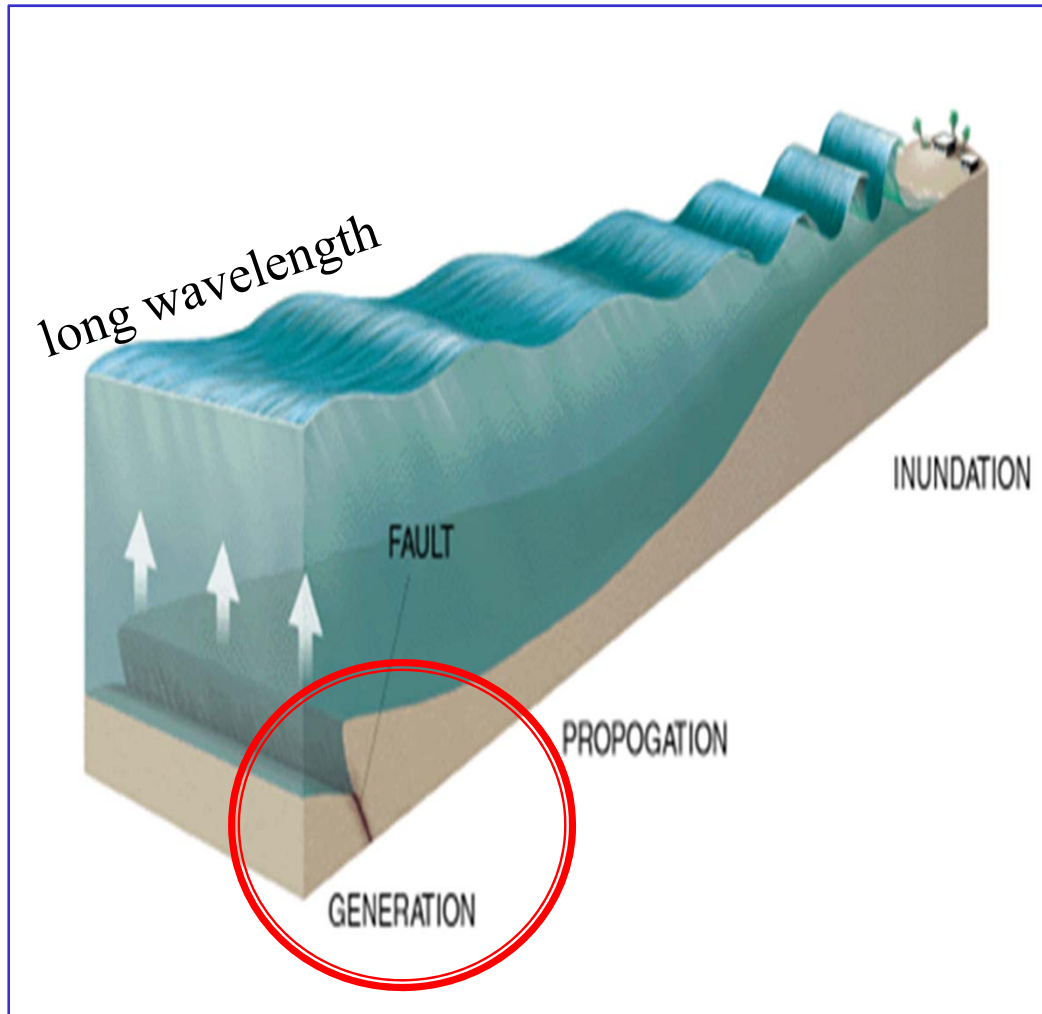
January 12, 2010, Mw 7.0, > 200,000 victims (EQ)



At least 7 people lost their lives from the tsunami.

Tsunami runup in Haiti (3m)

Generation, Propagation, and Inundation Phases of Tsunamis



Travel up to 500 mph in open deep seas

Tsunami Characteristics

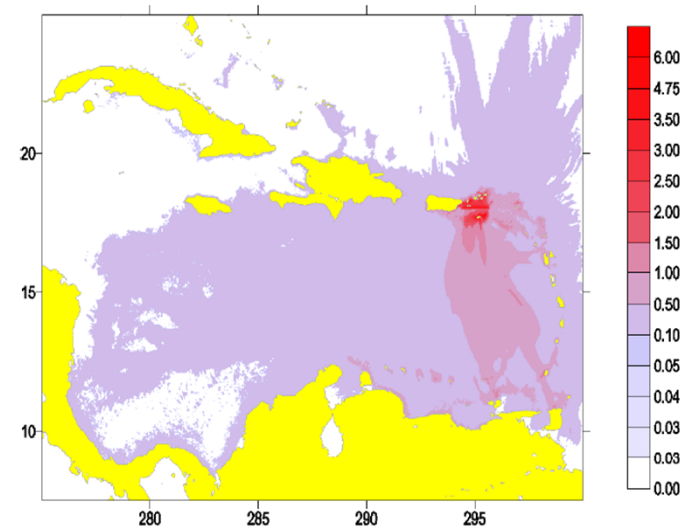
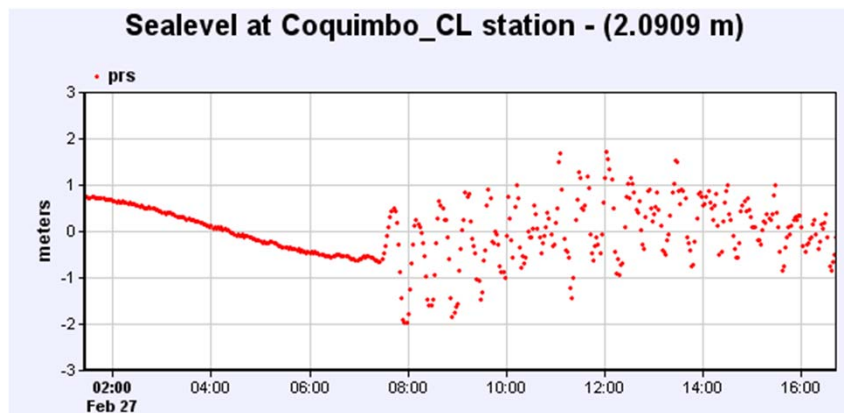
- **WAVE HEIGHTS GROW IN SHALLOW WATER**
 - **Best Case: Quickly Rising Tide**
 - **Worst Case: Wall of water with rocks and debris**
 - **High fatality hazard**
 - **Runups > 30 m**
 - **Wrap around islands**

*April 1, 1946
Aleutian Islands
earthquake Hilo,
Hawaii*



Tsunami Characteristics

- **DANGER CONTINUES FOR MANY HOURS**
- **NOT NECESSARILY WILL THE WATER FIRST RECEDE**
- **GLOBAL IMPACT blind to political boundaries**



1867 Tsunami Amplitudes Zahibo, et. al, 2003.

Currents and Flooding



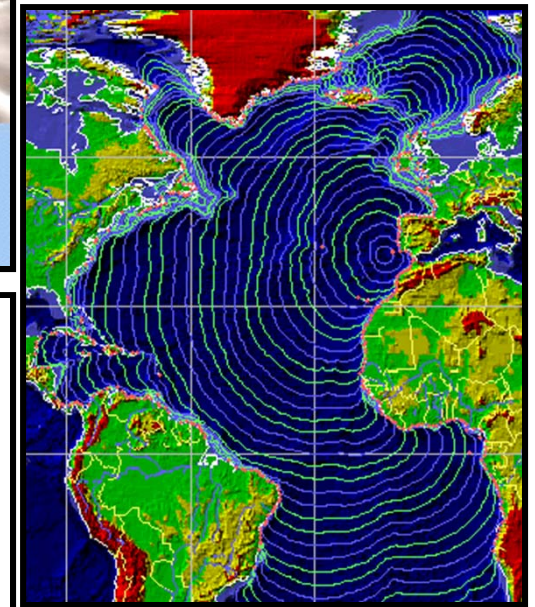
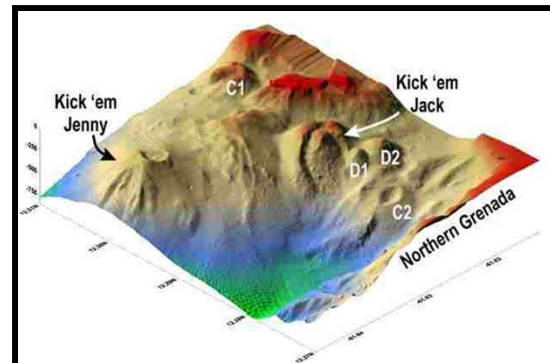
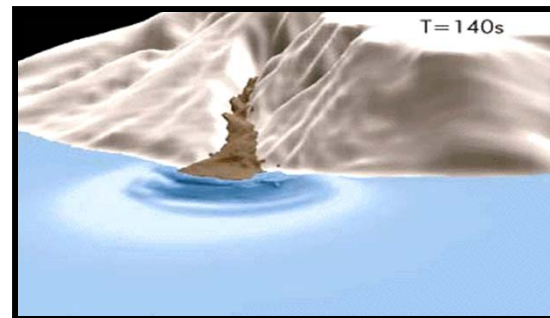
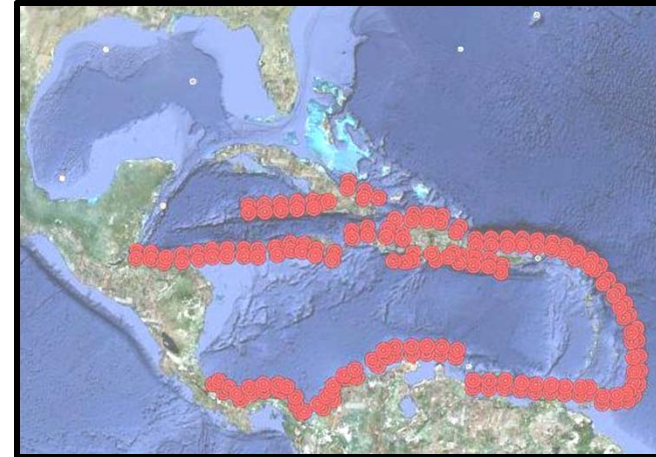
Ventura Harbor, California
Feb. 27, 2011
Chile Tsunami



Banda Aceh, Indonesia
Dec. 26, 2004
Indian Ocean Tsunami

Many sources of Tsunamis in the Caribbean

- Earthquakes (90%)
subduction zones & faults
throughout the
Caribbean
- Landslides (1%)
continental shelves,
trenches etc.
- Volcanoes (8%)
submarine & land
- Tele-tsunamis (1%)
e.g. “Lisboa” Nov. 1, 1755

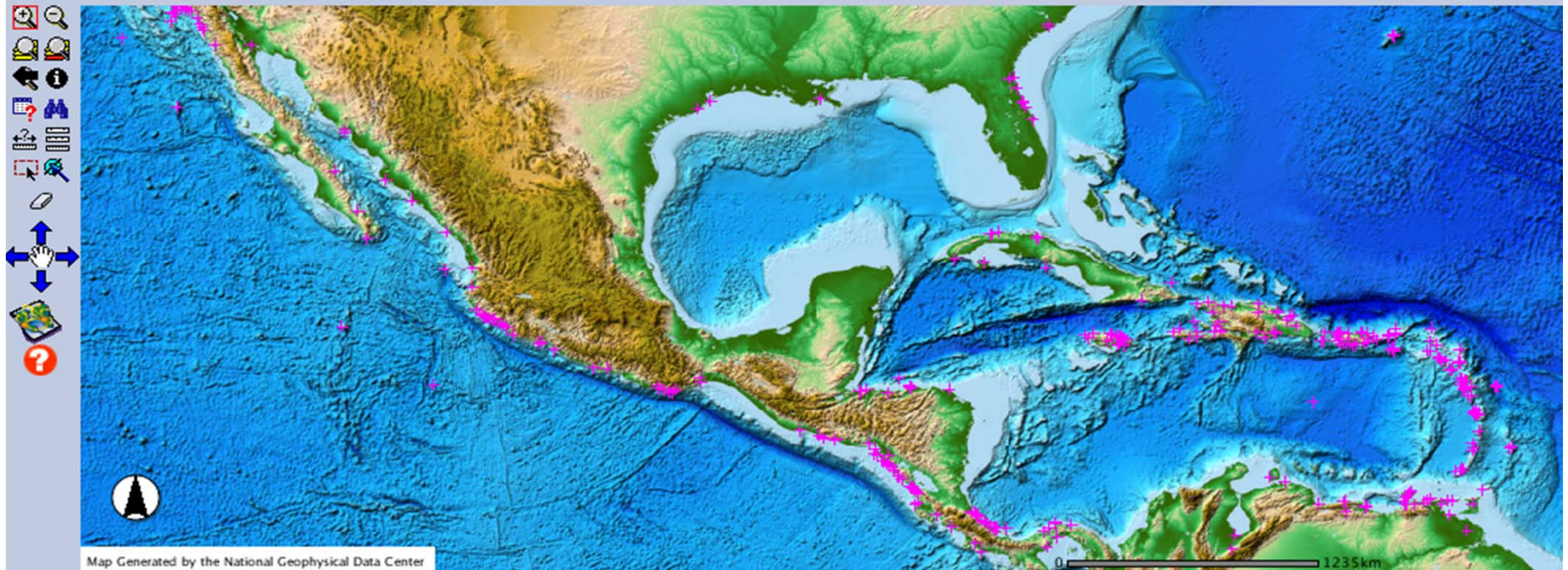


Historical Tsunami Runups in the Caribbean

http://www.ngdc.noaa.gov/hazard/tsu_db.shtml



NOAA > NESDIS > NGDC > Marine Geology > Natural Hazards



168 Years of Caribbean Tsunamis



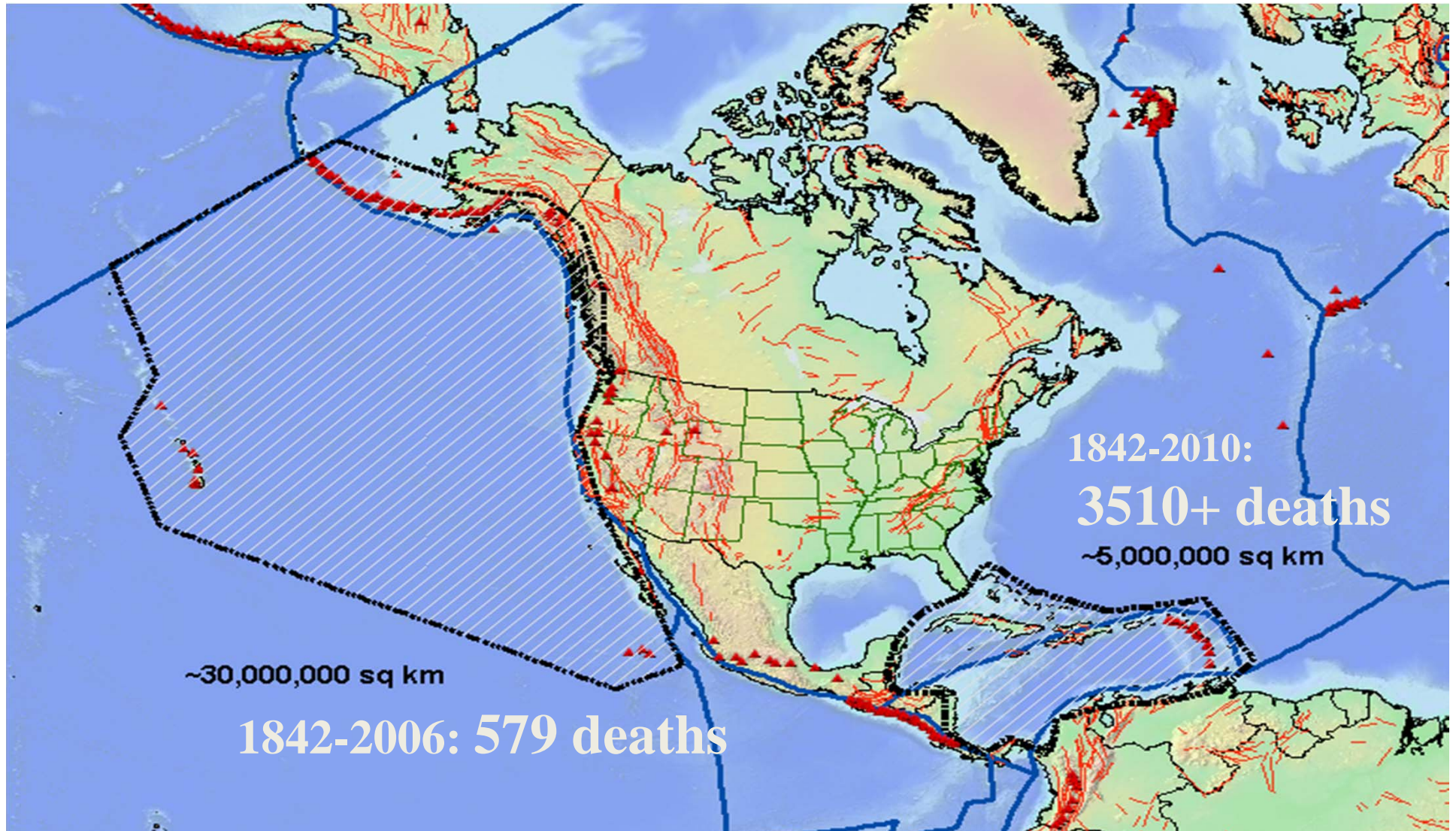
Deaths

Date	Place	Fatalities
1842	Haiti	300+
1853	Venezuela	600+
1867	Virgin Islands	23
1882	Panama	75+
1906	Jamaica	500
1918	Puerto Rico	140
1946	Dominican Republic(1)	1790
1946	Dominican Republic(2)	75
2010	Haiti	7
TOTAL		3510

Ref: *Caribbean Tsunamis, A 500-Year History from 1498-1998* by Karen Fay O'Loughlin and James F. Lander (2003: ISBN 1-4020-1717-0); Tsunamis of the Eastern US, NGDC, 2002 Science of Tsunami Hazards, vol 20, #3, pg 120; PRSN on Haiti, 2010

Since 1842, at least 3510 people have lost their lives to tsunamis, this is more than in the Northeastern Pacific...

The Caribbean basin in only 1/5 the area had nearly 6x more deaths !

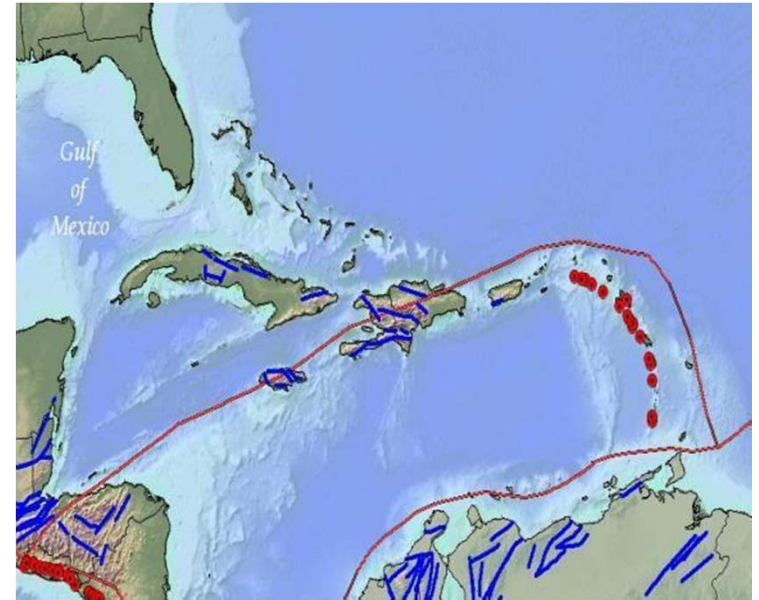




The Caribbean Situation



- Last major tsunami event(s):
Dominican Republic: 1790 +75 =
1865* deaths in August, 1946.
- Since 1946, explosive population growth across Caribbean from residents and tourists at the coasts
- Therefore, the Caribbean's historical deaths from tsunamis greatly understates its current 21st century potential loss of life!
- If we just take into consideration the number of people that can be on the beach, 50,000 people are exposed daily to tsunamis in the region.

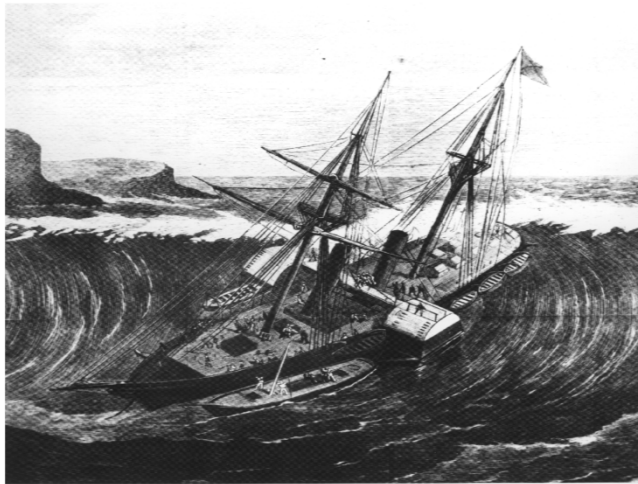


The Basin has many tsunami-genic areas: tectonic zones & faults, shelves-trenches, volcanoes

*Statistics from *Caribbean Tsunamis, A 500-Year History from 1498-1998*
by Karen Fay O'Loughlin and James F. Lander
(ISBN 1-4020-1717-0 2003 edition)

The risk to life from tsunamis has increased dramatically due to coastal population and tourism growth.

Here we see the port at Charlotte Amalie Bay, St. Thomas

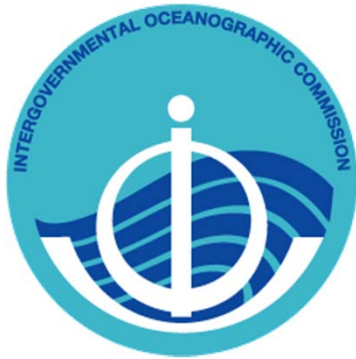


20 Foot tsunami, November 18, 1867

Same bay in St. Thomas today with 25,000 lives at risk !



30 people lost their lives on November 18, 1867 in a 20 ft tsunami. Today there can upwards of 15,000 to 25,000 people at risk because of cruise ships. Almost all these people are in the tsunami inundation zone around the bay, beaches and shops.



The regional response...

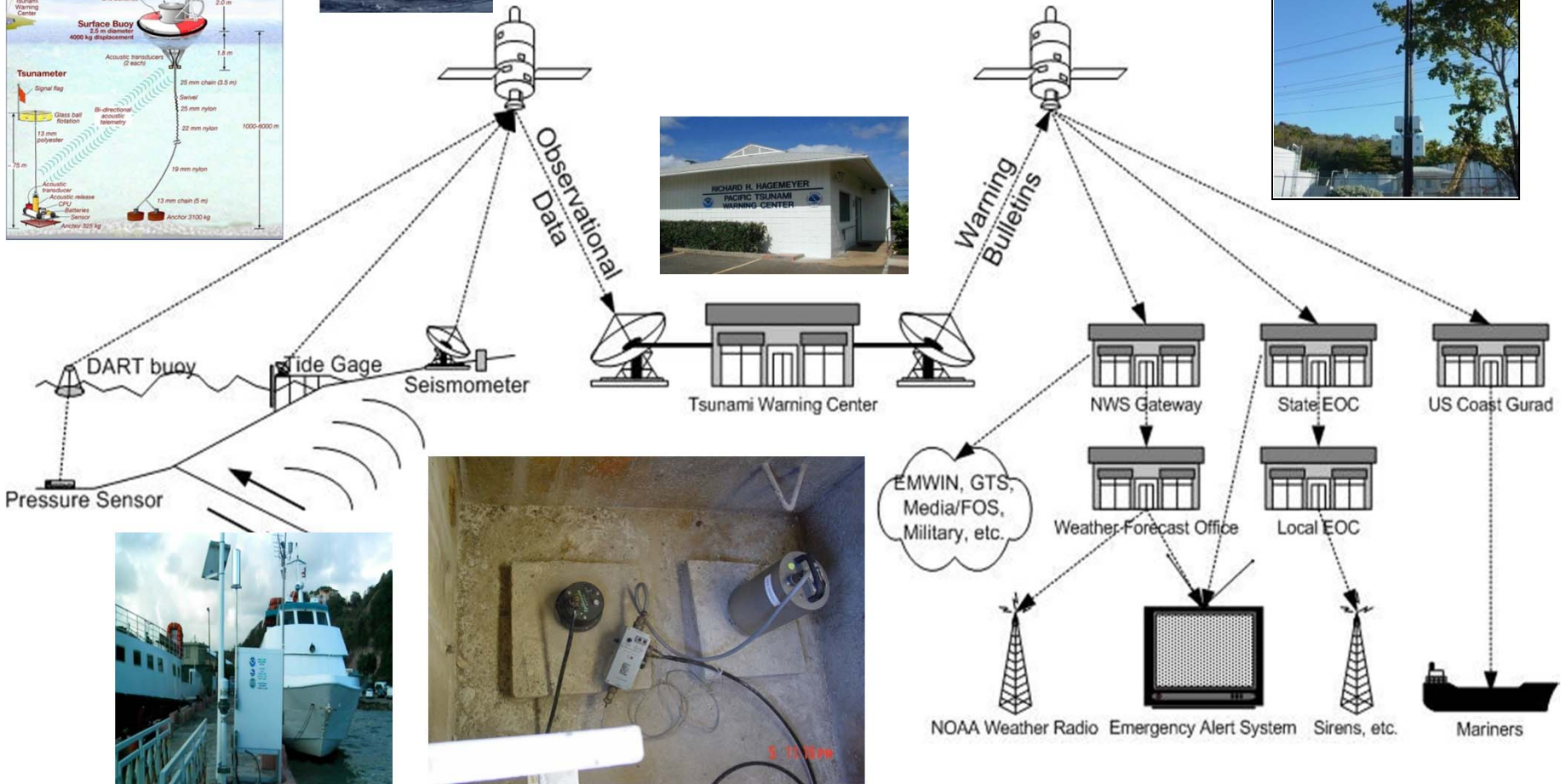
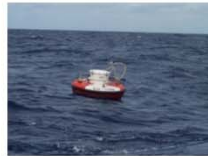
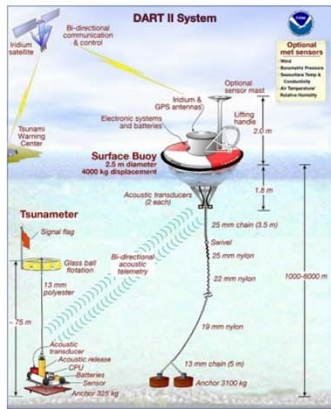
UNESCO IOC Intergovernmental
Coordination Group for Tsunamis and
Other Coastal Hazards Warning System
for the Caribbean and Adjacent Regions

Main Components of CARIBE EWS

Per recommendation of the Member States

- Working Groups:
 - Monitoring and Tsunami Warning Guidance
 - Tsunami Hazard, Risk and Vulnerability Assessments
 - Communications
 - Preparedness, Readiness and Resilience
- Permanent Bodies
 - Caribbean Tsunami Warning Center-CTWP potential first step
 - Caribbean Tsunami Information Center – to be established in Barbados with funding by the Govt. of Italy
 - Secretariat-Interim location in Paris, France at UNESCO HQ
- **National Stakeholders**
 - **National Tsunami Contacts**
 - **Tsunami Warning Focal Points**

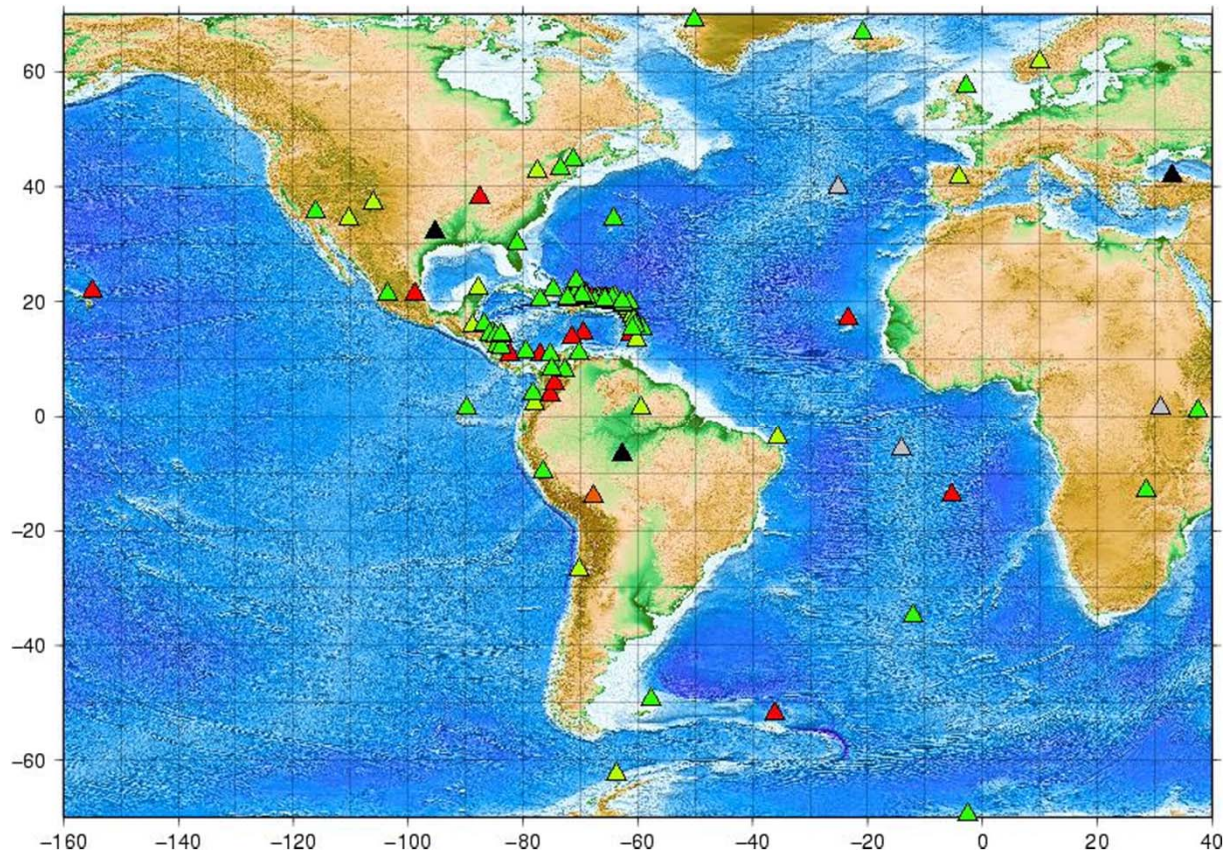
Monitoring and Warning Guidance



Seismic Data Availability in the Caribbean

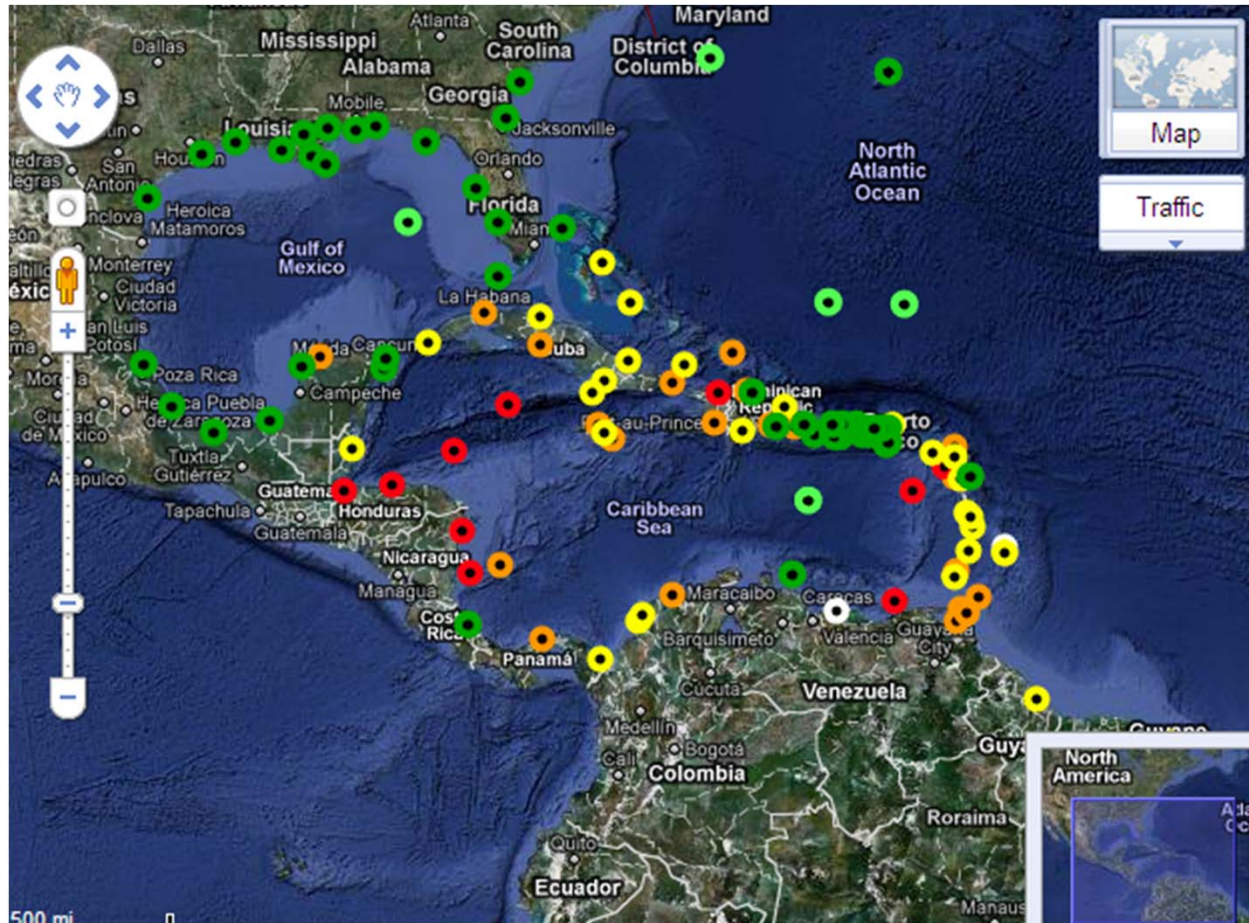
79% (101/128) of Core CARIBE EWS Stations in the Caribbean, Atlantic and Pacific are contributing in real time

<http://redsismica.uprm.edu/Spanish/>



Inventory of Sea Level Stations (coastal and DART) in the Caribbean

<http://www.srh.noaa.gov/srh/ctwp/>



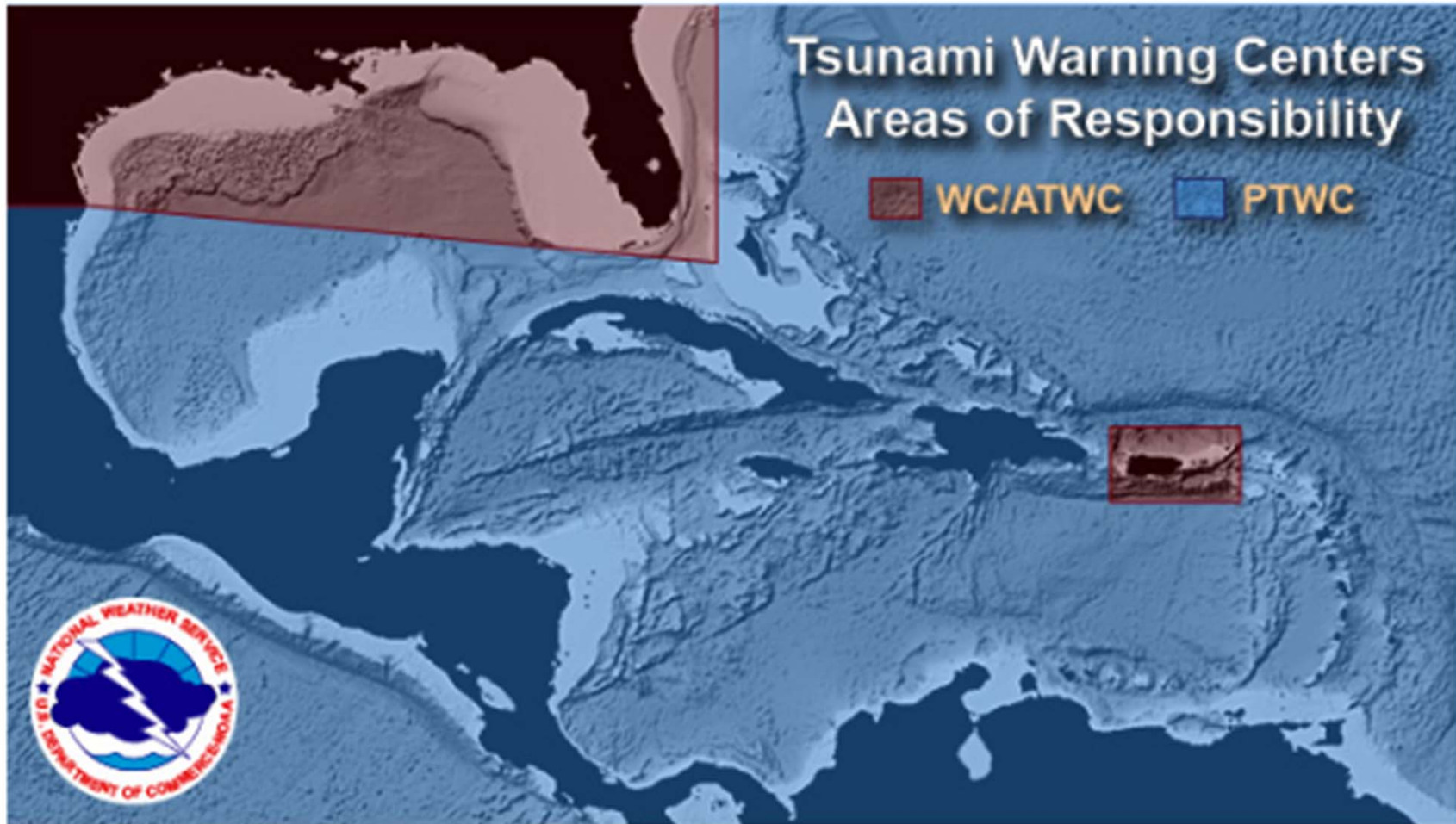
Coastal Sea Level Gauge
Dominican Republic



DART buoy

● Contributing RTX, ● Contributing RTX (DART), ● Existing, ● Gap, ● Planned, ● Non Operational/Unknown

Current Areas of Responsibility of



CTWC

“Providing regional service, strengthening local capabilities...”

- NOAA NWS established in February 1, 2010 the **Caribbean Tsunami Warning Program**, jointly located at the Puerto Rico Seismic Network at the University of Puerto Rico at Mayagüez as a 1st step of the U.S. towards the establishment of a Caribbean Tsunami Warning Centre.
- When will the Program become a Centre?
 - Funds are appropriated
 - Upon CARIBE EWS recommendation
- ICG VI will consider further contributions of MS to the establishment of a Regional Tsunami Warning Center



Communications

Reception and Dissemination

- 24 hour capability to rapidly receive and disseminate emergency information messages



**“80% of tsunami mortalities occur within the first hour after the source event”
(exception: 1946 Aleutian tsunami)
EOS-AGU, v.88, n. 52**

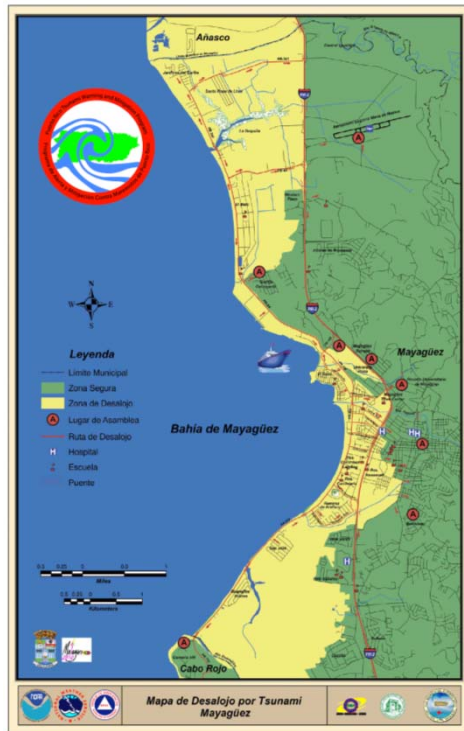


EMWIN

Preparedness, Readiness and Resilience

Key for the protection
of life and property

Evacuation Maps based on Inundation Maps or Best Practices are a critical tool for the community to identify the safe areas they must mobilize to in case of a threat



Installation and Maintenance (replacement) of Tsunami Warning Signs

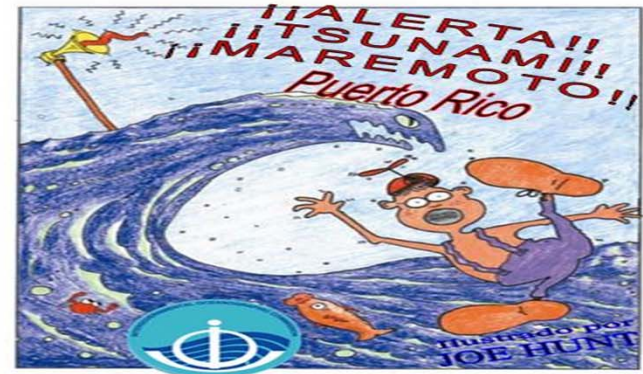


ISO Approved Signage



- **Tsunami Hazard Zone (left)** - To warn of a hazard from tsunami waves
- **Tsunami Evacuation Area (middle)** - To indicate the location of a safe place/uphill area for evacuation to in the event of a tsunami
- **Tsunami Evacuation Building (right)** - To indicate the location of a safe building for evacuation in the event of a tsunami

Tsunami Education, Awareness and Drills



America Samoa Tsunami, Sept. 29, 2009

Tsunami Ready

“When seconds count, TsunamiReady communities are ready to respond”

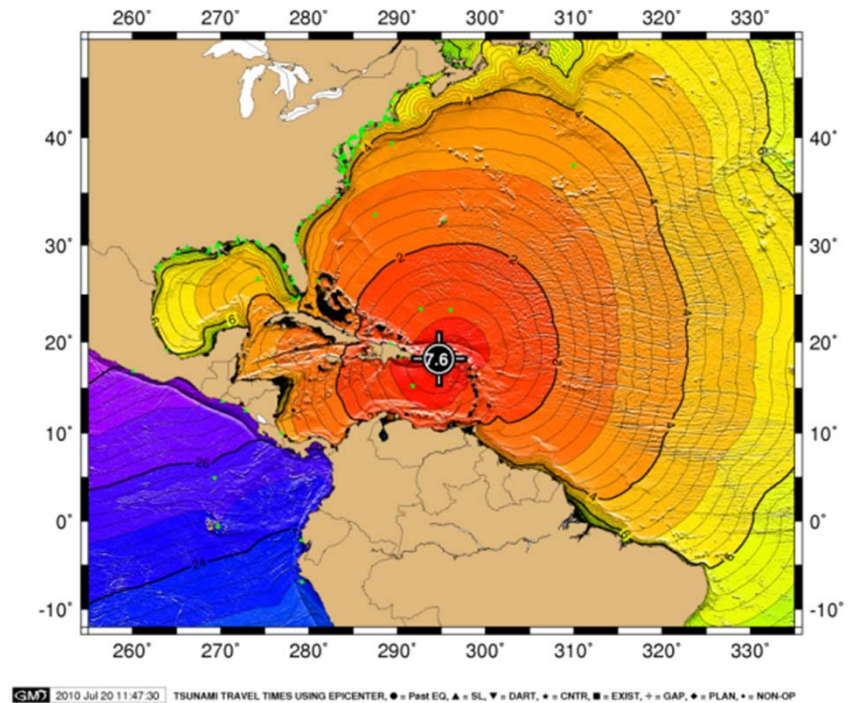
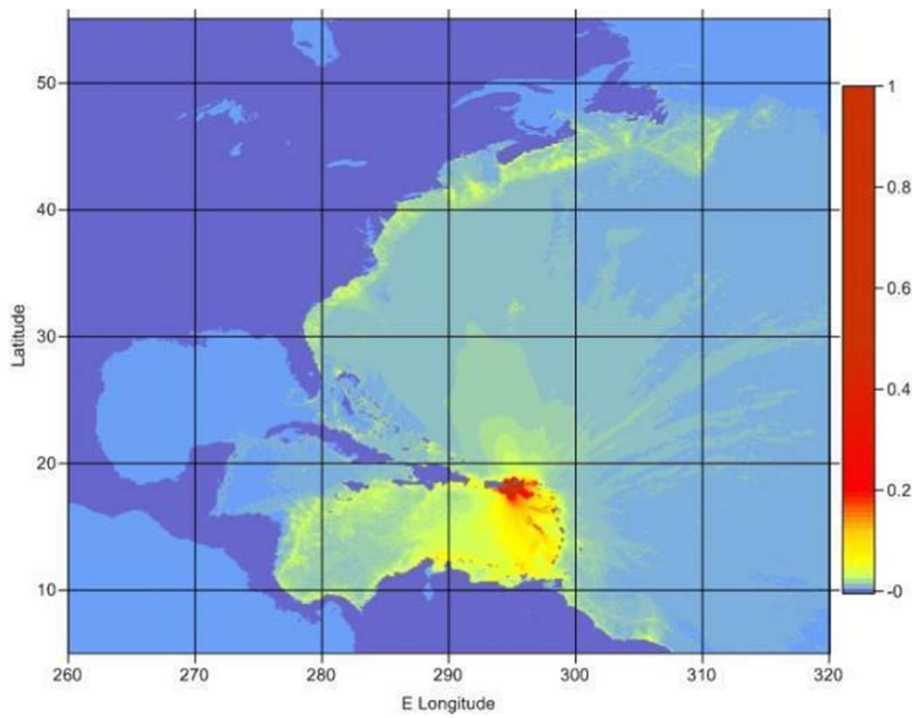


Recognition program of the USA NOAA NWS which recognizes communities that have met a specific set of operational, educational and administrative requirements



CARIBE WAVE LANTEX 2011, March 23, 2011

- Tsunami generated by a magnitude 7.6 earthquake in the US Virgin Island Basin (similar to the 1867 VI EQ and Tsunami)



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

PTWC Message for CARIBE EWS

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 (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 (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 (cont)

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 (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.

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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Working together to save lives, property and livelihood...



Thank you

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Caribbean Tsunami Messages

West Coast & Tsunami Warning Center
<http://wcatwc.srh.noaa.gov>
Puerto Rico Seismic Network
<http://redhismica.uprm.edu> Telephone: 787-833-8433
 TSUNAMI MESSAGES FOR PUERTO RICO AND THE VIRGIN ISLANDS

- WARNING**
 - Danger!
 - Run for high ground!
 - Follow emergency instructions.
- ADVISORY**
 - Possible strong and dangerous local currents.
 - Get out of the water and off the beach.
 - Stay tuned for local emergency guidance.
- WATCH**
 - Potential danger.
 - Stayed tuned for more information.
- INFORMATION STATEMENT**
 - Relax.
 - No danger.
 - A distant ocean basin may be in danger.

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

- CARIBBEAN SEA-WIDE TSUNAMI WATCH**
 - Danger for all coasts within the Caribbean Region!
 - Run for High Ground!
 - Follow the instructions of the emergency management officials.
- REGIONAL TSUNAMI WATCH**
 - Danger for coasts within a thousand kilometers from Earthquake!
 - Run for High Ground!
 - Follow the instructions of the emergency management officials.
- LOCAL TSUNAMI WATCH**
 - Danger for coasts within a hundred kilometers from Earthquake!
 - Run for High Ground!
 - Follow the instructions of the emergency management officials.
- INFORMATION STATEMENT**
 - Relax.
 - No Danger.
 - A more distant place may be in danger.