



**CTIC**  
Caribbean Tsunami  
Information Centre



Regional Training Workshop on Pacific Tsunami Warning Center  
Enhanced Tsunami Products for ICG/CARIBE EWS  
Oct. 31 – Nov. 1, 2017  
Cartagena, Colombia

# PTWC New Enhanced Products for the CARIBE-EWS: Overview

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# Outline of Presentation

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- **PTWC Recent Operational Activity**
- **PTWC New Enhanced Products**



# PTWC Activity: Oct 2013 – Oct 2015 (24 mo)

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- **6600+ Alarms (~275/mo, M4+) by EQs worldwide**
- **~770 Observatory Msgs (~32/mo, M5.8+) (=> CISN)**

FROM PACIFIC TSUNAMI WARNING CENTER

THIS IS PRELIMINARY DATA, NOT FOR PUBLIC DISSEMINATION.

COMPLETE INFORMATION CAN BE OBTAINED FROM THE USGS/NEIC

TELEPHONE (303) 273-8500.

H 08:24:47Z MAY 24 2014Z LAT 16.3N LONG 98.2W DEPTH 16.2km Mwp 5.7 (5 STATIONS)

NEAR THE COAST OF GUERRERO, MEXICO

PNIG P 082452.2 PNIG S 082456.7 UNM P 082535.0 CUIG P 082535.0

LVIG P 082542.5 PCIG P 082600.1 TGIG P 082600.5 ZAIG P 082638.8

LNIG P 082650.0 TEIG P 082713.5 TGUH P 082722.7 HKT P 082808.5

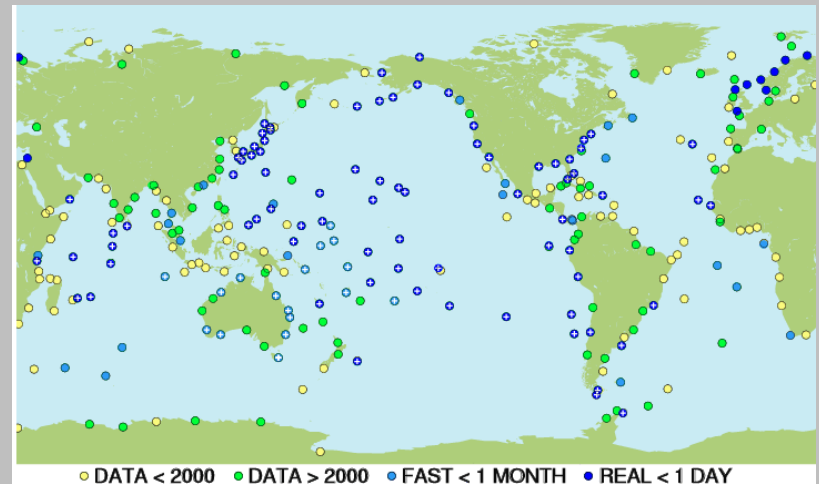
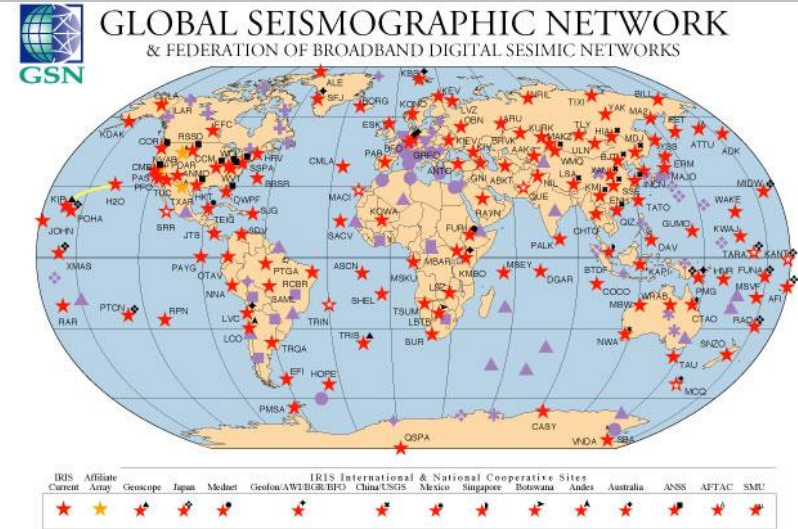
- **18 CARIBE-EWS Tsunami Information Statements (most for Atlantic earthquakes)**
- **99 PTWS Tsunami Information Statements**



# For Tsunami Warning - 3 Basic Needs

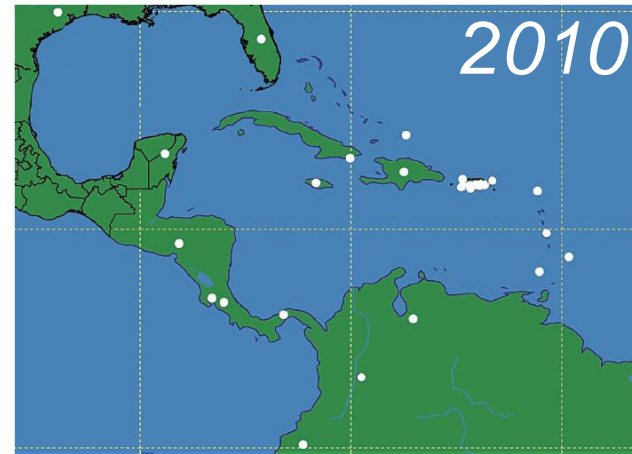
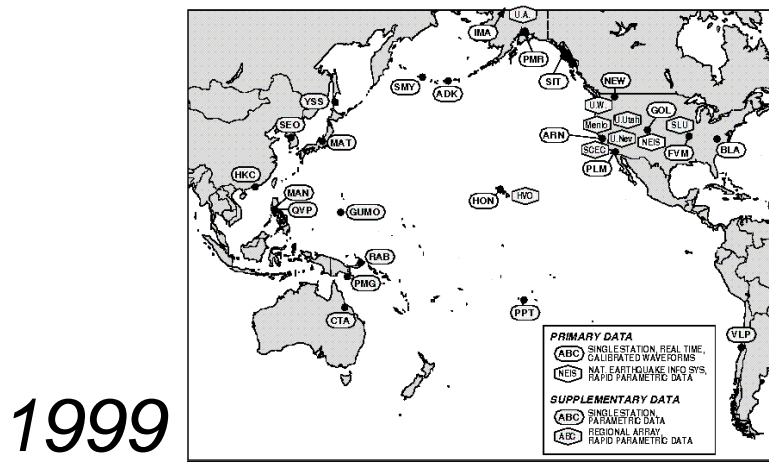
1. **Very Rapid Earthquake Evaluation** (sec-min)
2. **Very Rapid Tsunami Wave Detection and Measurement** (min-hr)
3. **Very Reliable Communications**  
*e.g., Multi-national, global data networks with real-time transmission and free/open data sharing*

➤ **ALL ARE REQUIRED FOR TIMELY WARNING**



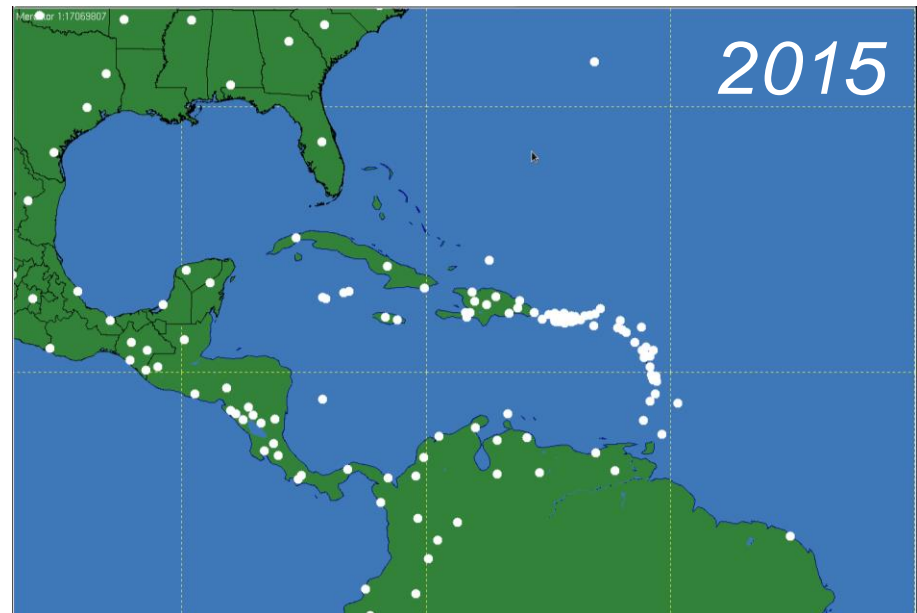
IOG GLOSS Network, incl real-time, non-real time, archive

# Core Seismic Network - PTWC

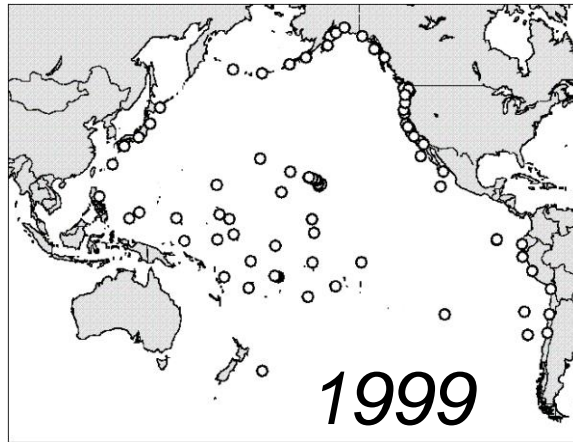


***In 2017, PTWC receiving data from ~ 650 broadband stations in real time***

***Earthquake location & magnitude in 10s of seconds to minutes***



# Core Sea Level Network - PTWC



***In 2017, PTWC  
receiving data from  
> 600 stations  
(coastal, deep-ocean)  
in real time***

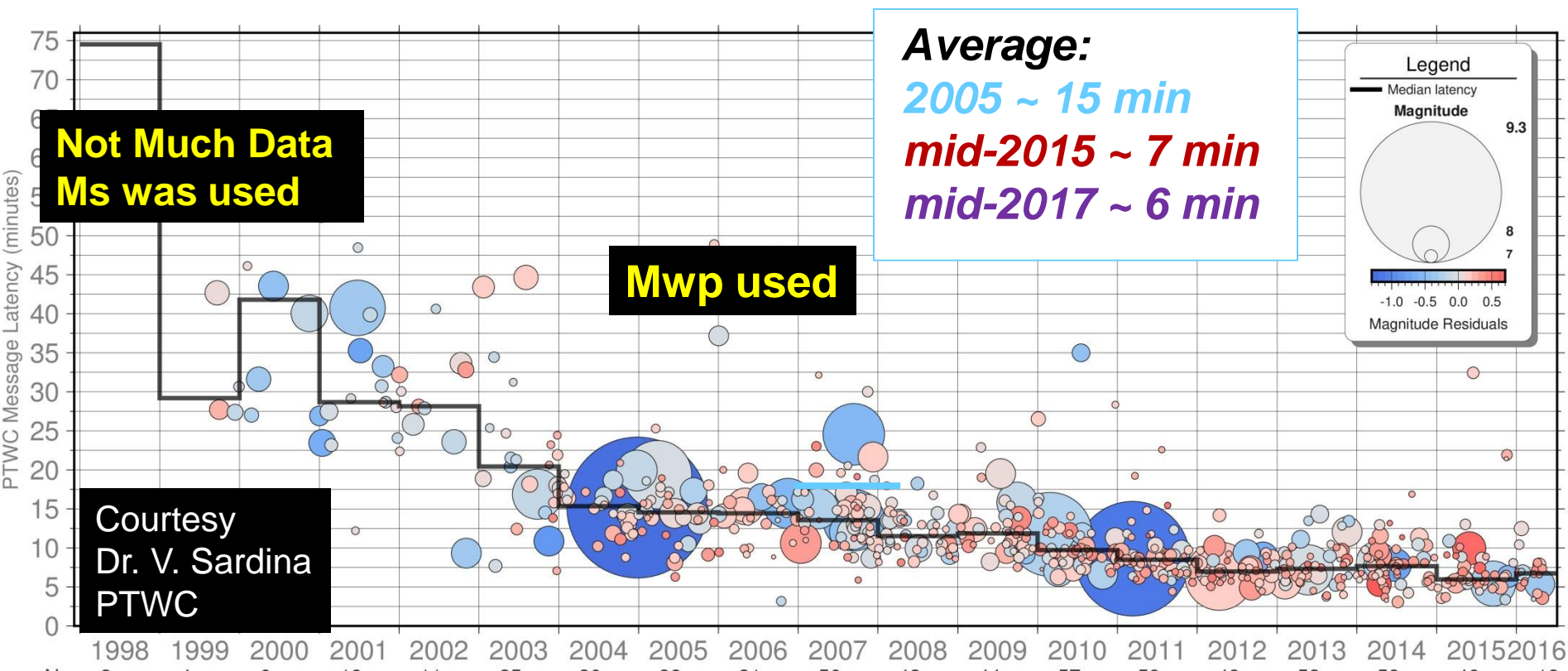
***=> Confirm tsunami  
within 1 hr locally***





# PTWC Pacific Response Time, 1993-2015

**Earthquakes:  
Denser Networks, Higher Quality Data, Better and  
Faster Methods => Faster Detection & Response**



# Current PTWC Products

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- **Public Text product only** (disseminated by GTS, AFTN, fax, email, EMWIN, website, SMS)
- **Product Content**
  - **Alert Level:** Places assigned to be in a Watch (equivalent to a warning)
  - **Forecast:** Estimated tsunami arrival times (ETAs) at designated forecast points
  - **Measurements:** Observed tsunami wave amplitudes
  - **Guidance:** General response guidance
- **Issued hourly, or sooner if new information**



# Former PTWC Products – Criteria Table



PRODUCT	CARIBBEAN EQ	ATLANTIC EQ
Information Statement	Mw: 6.0 – 9.9 Deep or Inland	Mw: 6.5 – 9.9 Deep or Inland
Information Statement	Mw: 6.0 – 7.0 Shallow, Undersea	Mw: 6.5 – 7.8 Shallow, Undersea
Local Tsunami Watch	Mw: 7.1 – 7.5 Shallow, Undersea	N/A
Regional Tsunami Watch	Mw: 7.6 – 7.8 Shallow, Undersea	N/A
Caribbean-Wide Tsunami Watch	Mw: 7.9 – 9.9 Shallow, Undersea	Mw: 7.9 – 9.9 Shallow, Undersea

# Limitations of Previous Procedures

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- **Very conservative for safety.** Based primarily on limited historical data. Result is significant over-warning
- **Initially puts areas in Watch based on:**
  - Earthquake magnitude
  - Estimated time left to tsunami impact
  - Distance from earthquake epicenter
- **Timely alert for regional and basin-wide tsunamis. Not as timely for local tsunamis.**
- **No information on forecast levels of wave impact**
- **PTWC alert level can cause confusion with Country's authoritative warning**
- **Text product only**

# PTWC New Enhanced Products -Timeline

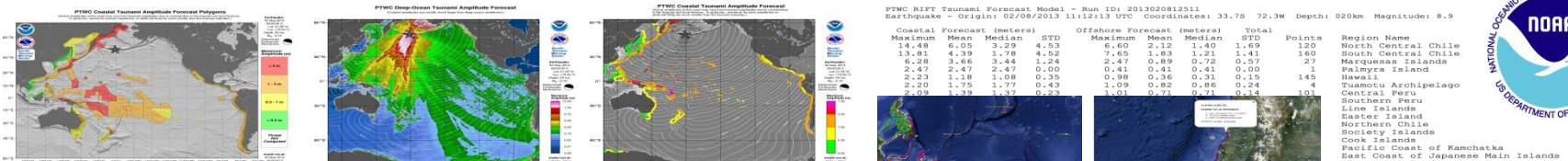
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- **History** – in discussion and requested since 2011
  - Discussed at last several ICG/CARIBE-EWS meetings
  - Exposed in last three CaribeWave Exercises
  - Several training sessions on the new products
  - In parallel with current products since Oct 24, 2015
- **Changeover: March 1, 2016, 0000Z**
  - PTWC stopping Watch Alert Level; Starting tsunami wave amplitude forecasts
  - Countries decide and issue own Alert Levels
- **Exercise CaribeWave16 – March, 2016**
  - Validate New Products



# Product Changes – Procedures, Products

- Base threat on wave forecast models, not on pre-determined magnitude threshold
- Forecasts constrained by EQ mechanism (W-CMT) and sea level readings
- **Public Text Message continues – Summary Information**
- **Graphical Forecasts and Statistics Table only sent to Country Tsunami Warning Focal Points (TWFP):**
  - Coastal Tsunami Amplitude Forecast Polygon Map - Overview
  - Deep-Ocean Tsunami Amplitude Forecast Map – Pacific-wide
  - Coastal Tsunami Amplitude Forecast Map – Pacific-wide and Regional, with Tsunami Travel Times
  - Coastal Tsunami Amplitude Forecast KMZ– input to Google Earth
  - Table of Forecast Statistics for Regional Polygons



# Product Changes - Threat Levels

- No more Watch Alert Level
- **Instead, 4 Threat Levels:** based forecast maximum coastal tsunami wave amplitudes

Forecast Tsunami Amplitude	Suggested Meaning
< 0.3m	No Threat
0.3m - 1m	Dangerous Currents, Harbor Surges, Minor Flooding
1m - 3m	Land Inundation
>3m	Major Destruction and Inundation
Other	Forecast Not Computed

# Benefits

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- **Reduce conflict with Country NTWC Alert levels**
- **Still conservative, but greatly reduce over-warning**
- **Provides estimated level of impact**
- **Provide Country NTWC with additional decision-making information**
  - Graphical, as well as text products
  - “kmz” file of forecast points allows drilling-down to finer spatial resolution
  - Real-time model handles earthquake locations and mechanisms anywhere, not just shallow-thrust events in subduction zones (limitation of SIFT / ATFM models)
  - RIFT model provides Green’s Law forecast for all coasts.

- **Update / New Terms and Definitions**

- **National Tsunami Warning Centre (NTWC):**

- A centre officially designated by the government to monitor and issue tsunami warnings and other related statements within their country according to established National Standard Operation Procedures (SOPs)

- **Tsunami Warning Focal Point (TWFP):**

- A 24 x 7 point of contact (office, operational unit or position, not a person) officially designated by the NTWC or the government to receive and disseminate tsunami information from an ICG Tsunami Service Provider according to established National Standard Operation Procedures. The TWFP may or not be the NTWC

- **Member States should update TWFP data to IOC**  
(especially for new CARIBE-EWS Products to start March 1, 2014)



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# Thank You

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