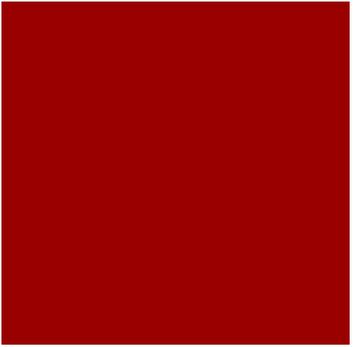


Tsunami Plans, Maps, and Procedures (PMPs)

Essential Tsunami Preparedness

US ↔ International: Sharing of Experience Pacific Partnership 2013 (US – NZ – Australia – 6 Pacific countries)



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Samoa
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"Information Sharing Saves Lives"

Disaster Management Office

DISASTER WATCH

DMO



ITIC New Training Course on Essential Tsunami Preparedness: Evacuation plans, Maps and Procedures

Nicolás Arcos, Laura Kong, Brian Yanagi
UNESCO/IOC – NOAA International Tsunami Information Center

Course Development Team

Bernardo Aliaga (UNESCO/IOC); Dr. Diego Arcas (NOAA PMEL)
David Coetzee, NZ MCDEM; Christa von Hillebrandt (NOAA CTWP)
Mylene Villegas (Philippine Institute of Volcanology and Seismology (PHIVOLCS))
George Crawford (former WA EMD); Tim Walsh (WA DNR)

PTWS Medium-Term Strategy 2014-2021

Three Pillars:

1. Risk Assessment and Reduction
2. Detection, Warning and Dissemination
3. **Disaster Management and Preparedness**
 - Public education, **Emergency planning and Response**

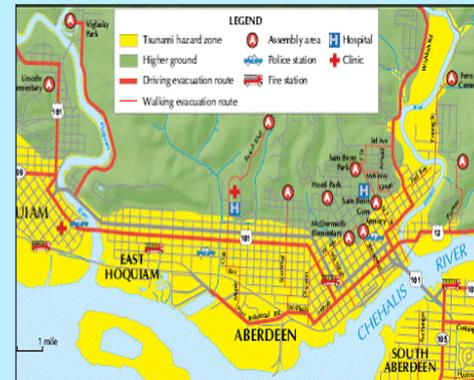
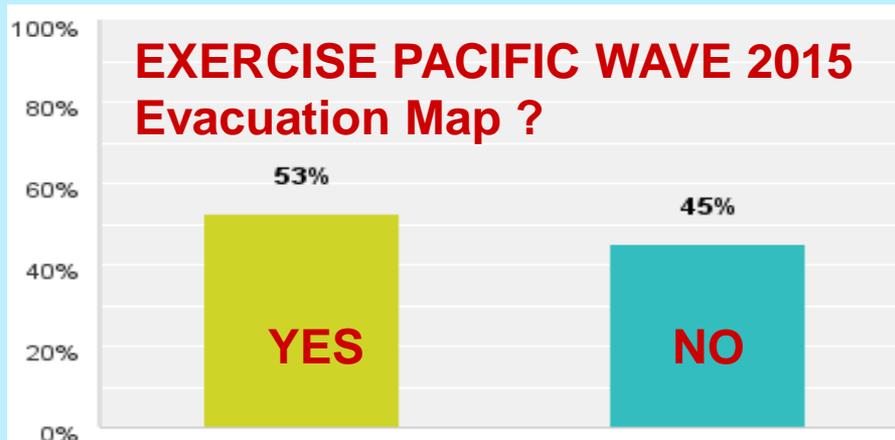


Otsuchi, Japan. 2011
Great East Japan
Earthquake and Tsunami

PTWS Next Priority (5 yrs) – Preparedness

Following 1 October 2014 New Products start, the next PTWS priority focus is Preparedness

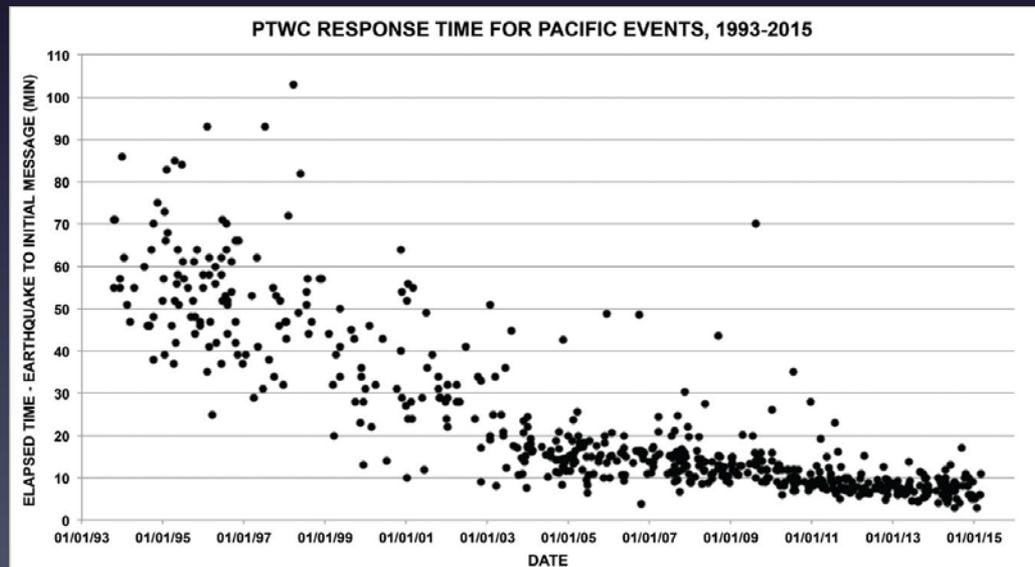
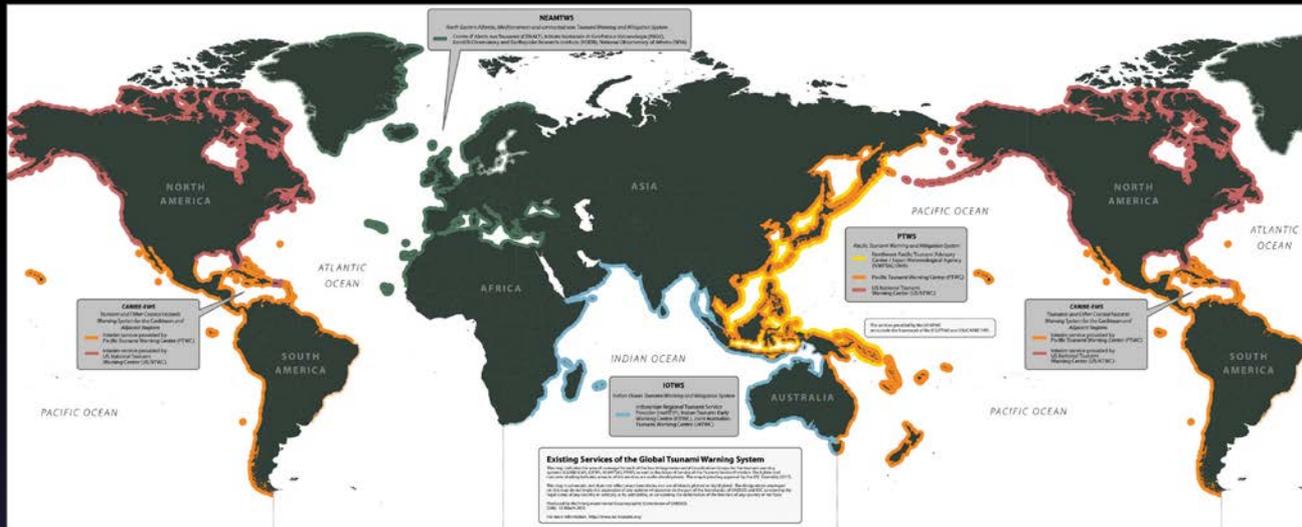
- *Communities must know what to do and where to go when a tsunami is imminent (> 50% lack plans)*
- *ITIC capacity building course –Tsunami Evacuation Plans, Maps, Procedures*



Tsunami Signage

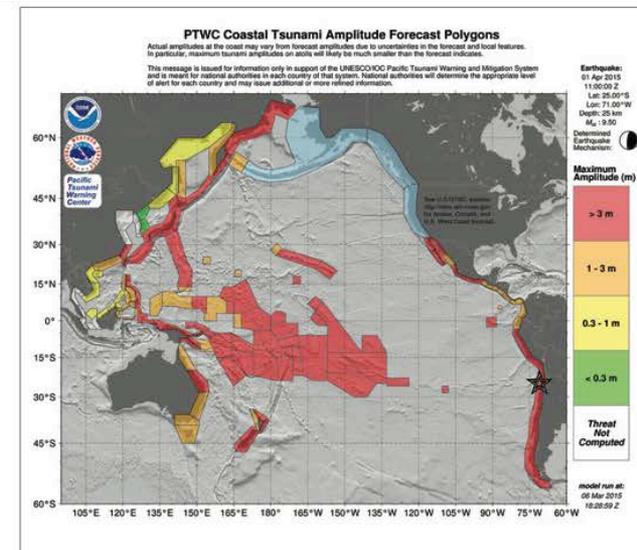
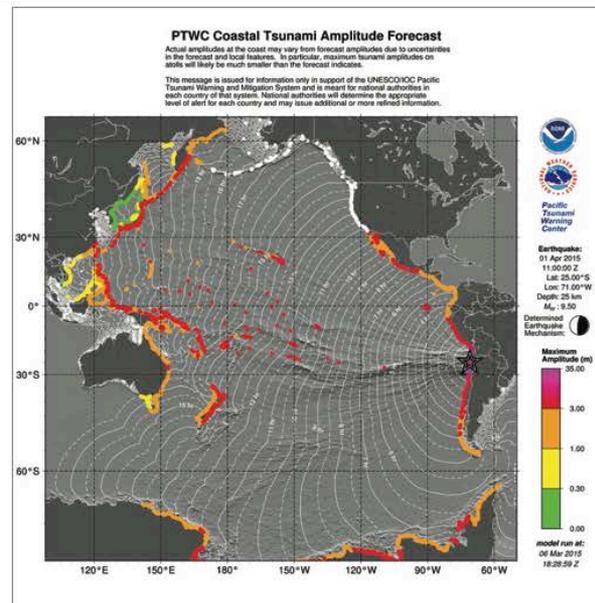
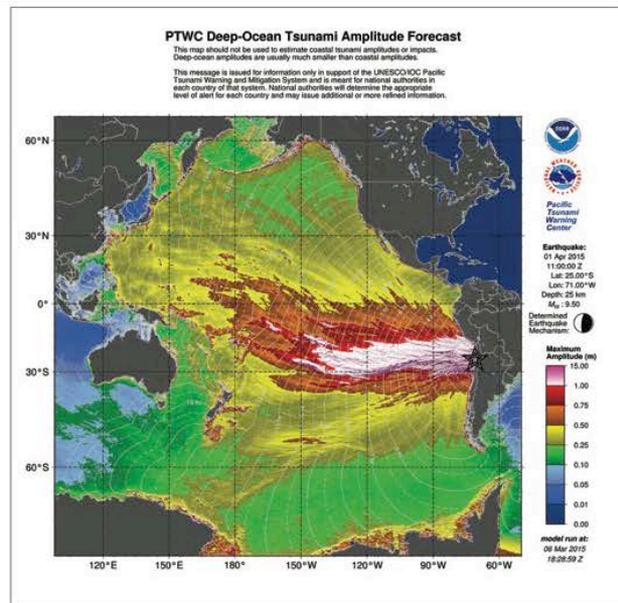


PTWS Today & Tomorrow



Real-time Tsunami Forecasts available – PTWC models

- SIFT forecasts calibrated by DART observations, with detailed inundation forecasts if SIMS available (US)
- RIFT forecasts using real earthquake source (W-phase CMT), for all coasts around the world



Example of PTWC New Enhanced Products for an extreme tsunami scenario, M9.5 earthquake and tsunami off the northern coast of Chile. (Credit: PTWC)

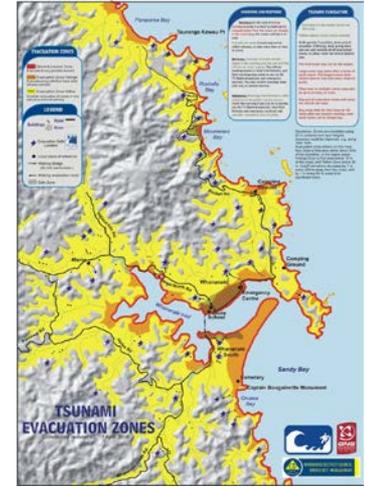
Tsunami Evac PMP Course: 2015-2016

GOAL: Produce reliable tsunami evacuation maps working with communities and govt agencies. Course globally applicable Standardized tools and methodologies

- 1. Announcement and call for applications**
 - May 2015, Honduras selected (1 Pacific, 1 Caribbean)
- 2. Pilot Kick-off, June 2015**
 - Stakeholders coordination meeting
 - Brief on process. ID communities/agencies/govt/NGO
- 3. Linked training workshops, 1 year start July 27**
 - Start with modelling, End with functional exercise
- 4. IOC Publication: 2017**
 - Review / Endorse by Intergovernmental Coord Groups (Pacific, Carib, Indian, Med), Global TOWS WG
 - IOC Manual: Tsunami Evac Plans, Maps, Procedures
- 5. Simultaneous pilot in a Pacific Island country?**

Course Development - Partners

- ❑ **ITIC lead**, in collaboration with New Zealand, Philippines, USA, UNESCO IOC, PTWS WGs, Global TOWS WG etc
- ❑ **Course Development Team** - Warning, Modelling, Disaster Mgmt, Community Preparedness, Educ/Outreach experts
- ❑ **Pilot country feedback**
- ❑ **PTWS Task Team Evac Planning and Mapping (draft)**
 - Chair – Dr. Laura Kong, Director, ITIC
 - Topical and Regional experts and/or resource people
 - Caribbean: Alison Brome, Caribbean Tsunami Information Center
 - Central America: Norwin Acosta, Nicaragua, INETER
 - Indian Ocean: Ardito Kodijat, Indian Ocean TIC
 - SE Pacific: Representative, NDMO, and Chair, SE Pacific WG
 - SW Pacific: 'Ofa Fa'anunu, Tonga Met Svcs; Chair, PTWS SW WG
 - DRR / Comm Preparedness: Julie Leonard, USAID, PTWS WG 3 VC



New Zealand

Trai: Modeling for Inundation Mapping

1. Simple approach:

- Historical observations provide value of maximum tsunami run-up in locality
- This constant value of maximum run-up will be used to determine inundation line everywhere in the community

2. Refined approach:

- Historical seismic events are used as tsunami sources in hydrodynamic models.
- Hydrodynamic models are used to compute tsunami inundation and run-up. Variable maximum run-up will be used at different locations

3. Sophisticated approach:

- A Credible Worst Case scenario is evaluated from all available data (historical, seismic, tectonic)
- Hydrodynamic models are used to compute tsunami inundation and run-up. Variable maximum run-up will be used at different locations

Five (5) Trainings (2015-2016)

1. Tsunami Modelling, July 27-21, 2015

- ❑ ComMIT (PMEL) modelling tool – science, uncertainty, sources, DEMs, how to run, interpreting results

2. Inundation mapping – January 2016

- ❑ Identify tsunami scenario sources – maximum considered EQ Expert Meeting, early January 2016
- ❑ Country uses modeling software to create inundation maps using tsunami sources, late Jan – Feb 2016

3. Evacuation mapping – April 2016

- ❑ Quality control - Pilot country present and vet inundation map results with modeling experts
- ❑ Going from science maps (inundation) to evacuation maps (public safety). Drawing lines, Tsunami Evacuation modelling guidelines, Signage, Walking routes

Five (5) Trainings (2015-2016)

4. Standard Operating Procedures, June 2016

- Tsunami Warning and Emergency Response Training – Plans and Procedures. 24/7, Special needs populations
- TsunamiReady (TsunamiSmart) concepts (warnings, dissemination, evacuation maps, signage, awareness, education)



5. Tsunami Exercise, Sept 2016

- End-to-end (functional?) Tsunami Exercise, including evacuation of community where maps developed
- Official Ceremony: Tsunami Evacuation Map



*Earthquake & tsunami drill
Arica and Parinacota,
Chile, 2010*

Course Development Team Meeting

Honolulu, Hawaii. 22-25 June 2015.

Participants

- Bernardo Aliaga, UNESCO/IOC
- Brian Yanagi, ITIC*
- Carolina Hincapie, CTWP (*starting 01 Aug*)
- Chris Moore, NOAA/PMEL
- Crystal van Beelen, Honolulu C&C DEM*
- David Coetzee, NZ MCDEM
- Diego Arcas, NOAA/PMEL
- Gretchen Chiques, NOAA/OCM*
- Laura Mylene Kong, ITIC*
- Villegas, PHILVOCS*
- Nicolas Arcos, ITIC*
- Peter Hirai, Honolulu C&C DEM*
- Tim Walsh, WA DNR*



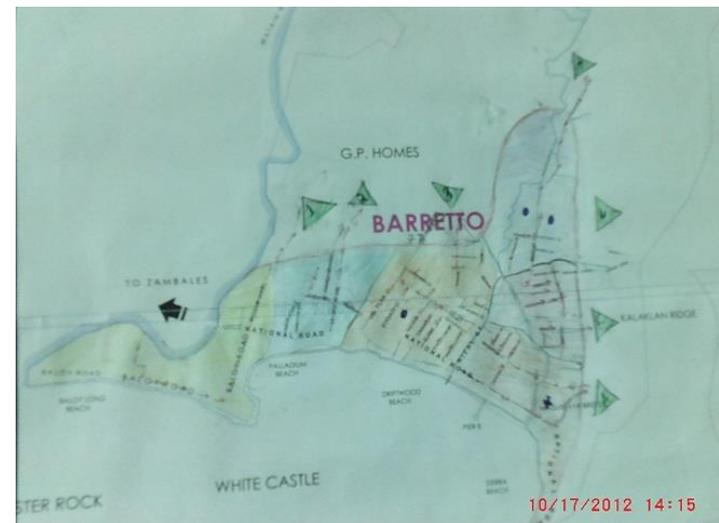
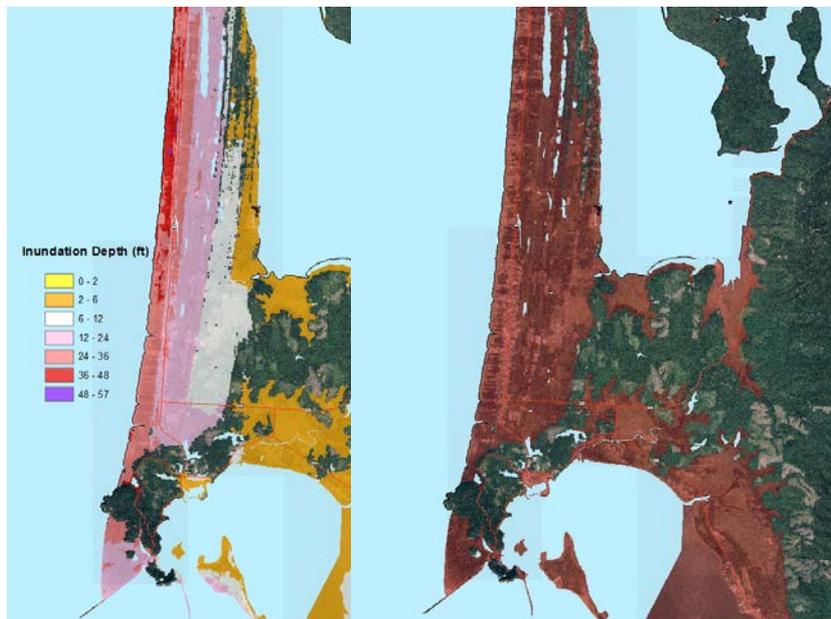
On-site meeting participants

**On-site participants*

Course Development Team Meeting

Presentations on **methodology** and **tools**

- Inundation and evacuation mapping best practices: Caribbean, Hawaii, New Zealand, Washington State, Philippines, UNESCO/IOC
- Hazard and evacuation mapping tools: ComMIT, GIS, locally/community generated



*Left: Washington State
Right: Philippines*

Course Development Team Meeting

Outcomes: Training 1 Agenda - ComMIT

Day 1	Day 2	Day 3	Day 4	Day 5
End-to-End Tsunami Warning System	EQ Source Parameters	Modeling Hazard Assessment	Hazard Assessment Products	Hazard Assessment Implementation (Hands-on)
EQ Tectonics & Hazard	Forecast Methodology			
Tsunami Hazard for Region	Tsunami Modeling using ComMIT	Tsunami Modeling (Types)	Hazard Assessment Implementation (Hands-on)	Hazard Assessment Results Presentation
Tsunami Science	ComMIT Installation			
Bathymetric & Topo Grids	Reference and SIM Creation			
		Hazard Assessment Exercise (Hands-on)		Future Direction (Goals and Timelines for next training)
		Modeling Time (Hands-on)		Certificate Presentation



Looking to highlight NTHMP best practices!

Thank you

Nicolás Arcos, Laura Kong
UNESCO/IOC – NOAA International Tsunami Information Center