

Dr. Laura Kong

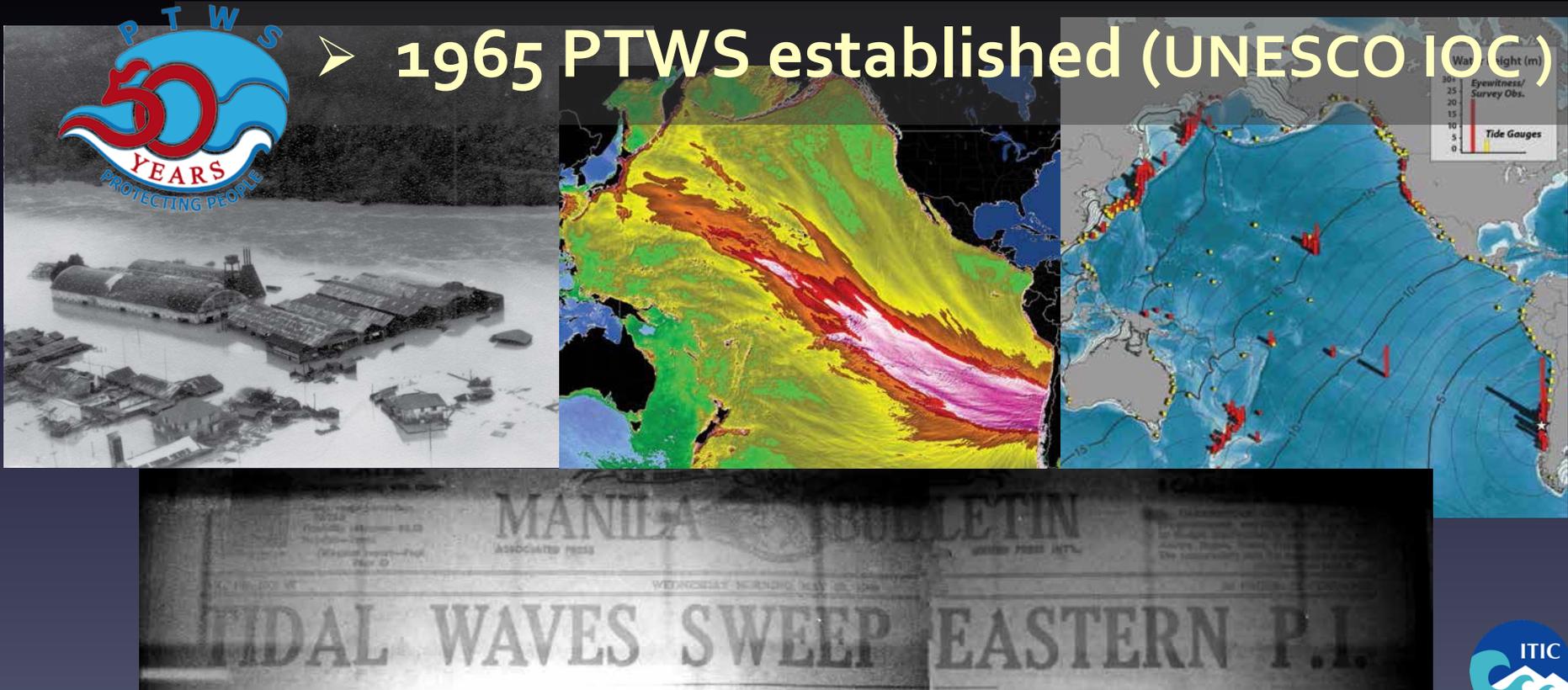
Director, UNESCO/IOC-NOAA

International Tsunami Information Center (ITIC)

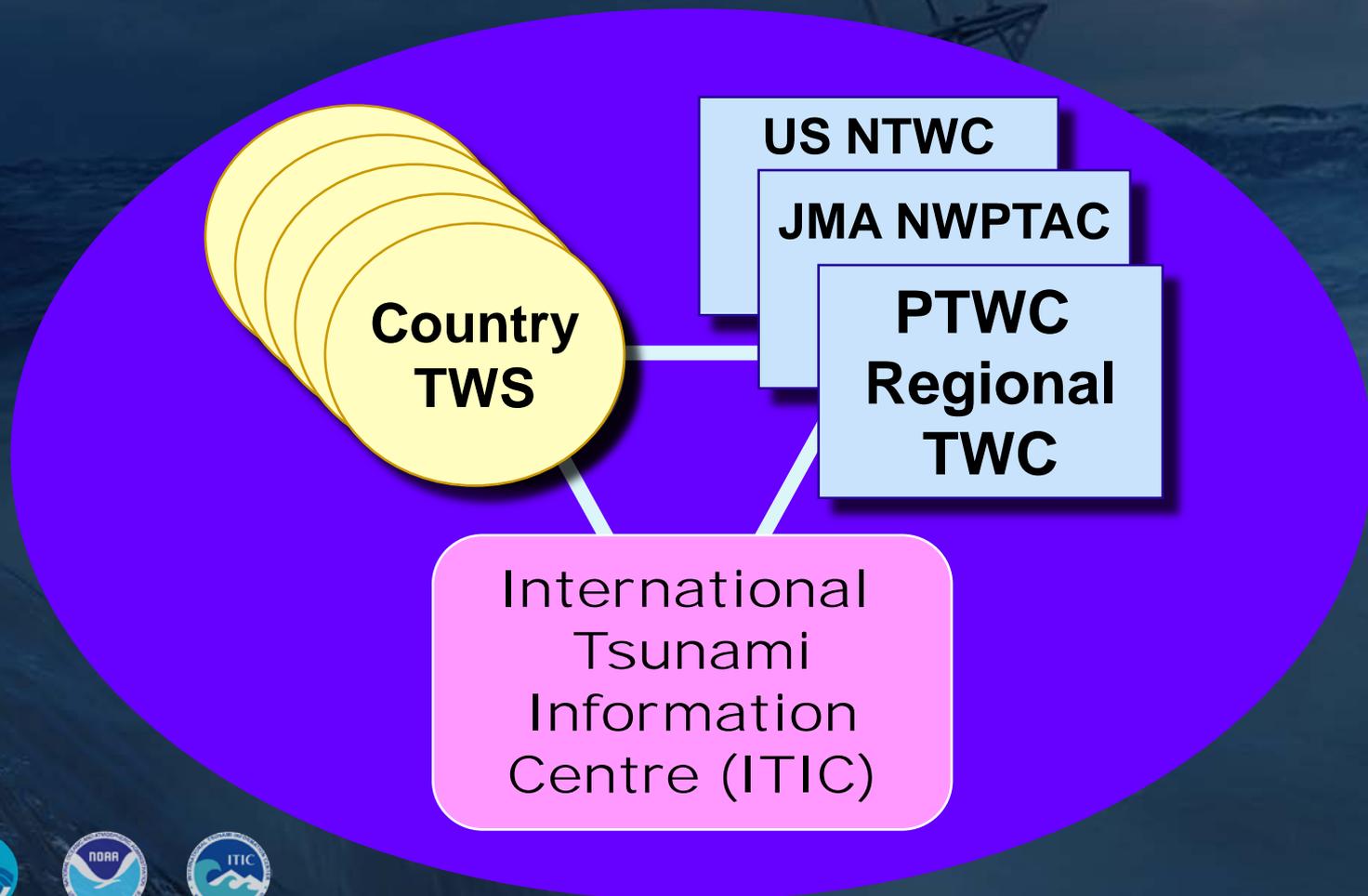


1960 Deadly Basin-wide Tsunami

- 1960 9.5 Mw Chile earthquake generated a tsunami that killed 2000 in Chile, then hundreds in Hawaii, Japan, and the Philippines => No international warning



PACIFIC TSUNAMI WARNING AND MITIGATION SYSTEM : Foundational Elements





ITIC – INTERNATIONAL

IOC Mandate & Functions (1977)



- ❑ **Monitor / Recommend Improvements** to PTWS and other tsunami warning systems – communications, data networks, evaluations, dissemination
- ❑ **Assist in establishing** regional and national tsunami systems – comprehensive risk reduction
- ❑ Serve as **technology transfer** resource;
Encourage research to improve evaluations;
Conduct **trainings to build capacity**
- ❑ Serve as an information resource for **preparedness / education; Develop, publish, distribute materials**
- ❑ Serve as an information resource on **historical tsunamis – database, post-event surveys**

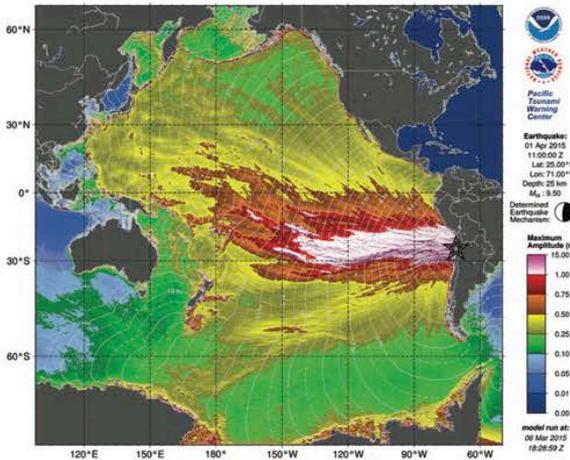
Pacific PTWC International Products – Forecasts available since 1 Oct 2014

- RIFT forecasts using real earthquake source (W-phase CMT), for all coasts around the world
- ITIC - International Training to support implementation

PTWC Deep-Ocean Tsunami Amplitude Forecast

This map should not be used to estimate coastal tsunami amplitudes or impacts. Deep-ocean amplitudes are usually much smaller than coastal amplitudes.

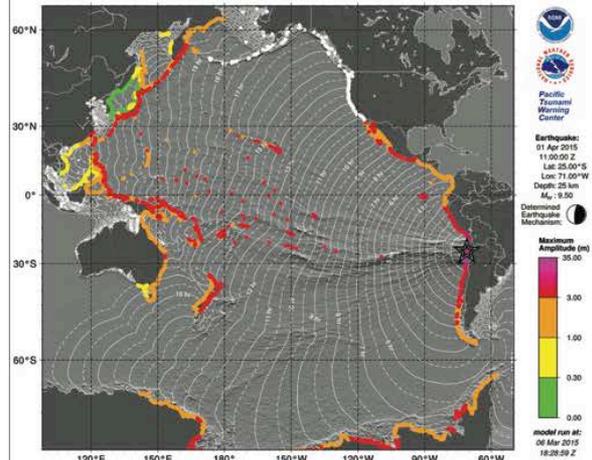
This message is issued for information only in support of the UNESCO/IOC Pacific Tsunami Warning and Mitigation System and is meant for national authorities in each country of that system. National authorities will determine the appropriate level of alert for each country and may issue additional or more refined information.



PTWC Coastal Tsunami Amplitude Forecast

Actual amplitudes at the coast may vary from forecast amplitudes due to uncertainties in the forecast and local features. In particular, maximum tsunami amplitudes on atolls will likely be much smaller than the forecast indicates.

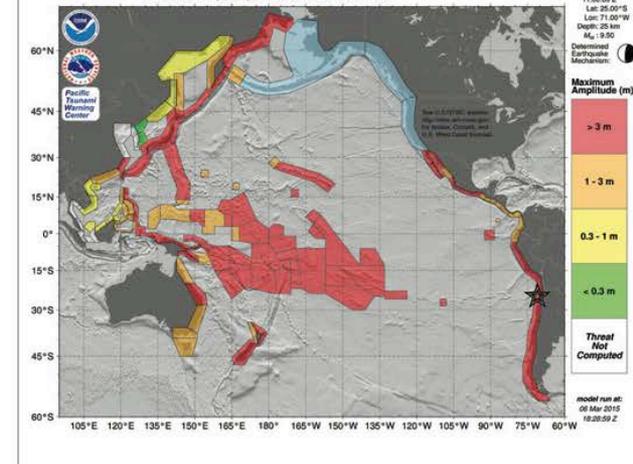
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PTWC Coastal Tsunami Amplitude Forecast Polygons

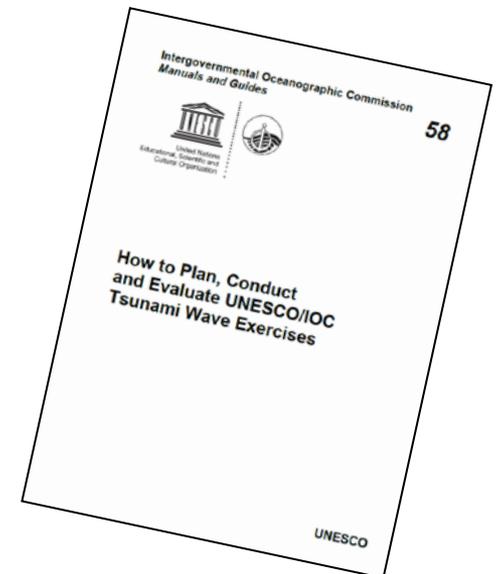
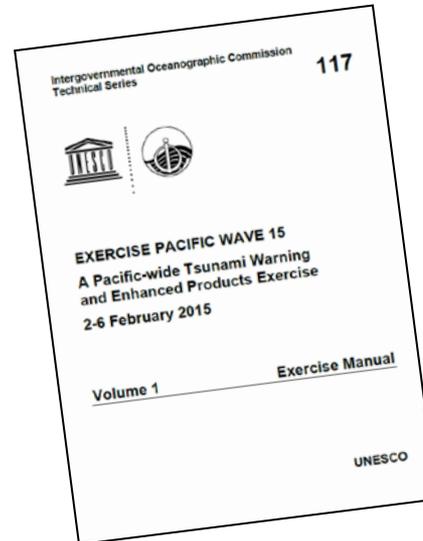
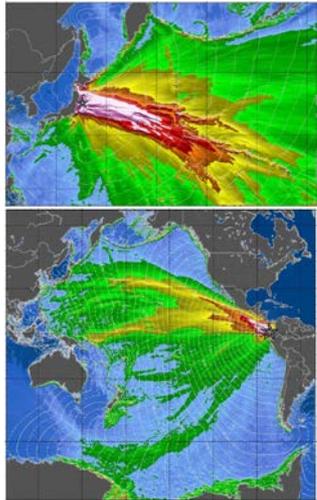
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UNESCO Exercise Pacific Wave exercises

- ❑ 6th International Exercise – 2006, 2008, 2011, 2013, 2015, 2016
- ❑ Test Readiness: intl to local govt; distant and local tsunamis, new products
- ❑ Manuals and Guidance



ITIC Training– 2013 - 2015



◆ IDSS for PTWC International products

□ ITP-International training

- 20+ 1-week international and 8 1-day US domestic training/workshops (700 trained)
- US Compacts – issue own products (FSM, Palau, RMI)
- Caribbean (21 countries, USA PR)
- **1 ITP-Hawaii (Aug 2014)**

14 Pacific countries (Federated States of Micronesia, Marshall Islands, Palau); 1 Indian Ocean country (Oman) - 30 trained

◆ New Intl Course – Tsunami Evac Maps, Plans, Procedures



Tsunami Warning Decision Support Tools (ongoing):

- Heads-up SMS TW Alert (NOAA/USAID RANET, PTWC) – since 2005
- **Tsunami Bull Board (ITIC) – since 1995, curr ~450 science/tsu/govt**
- **Real time Earthquake Display / California Integrated Seismic Display (USGS, NTHMP) – since 2005, curr >200**

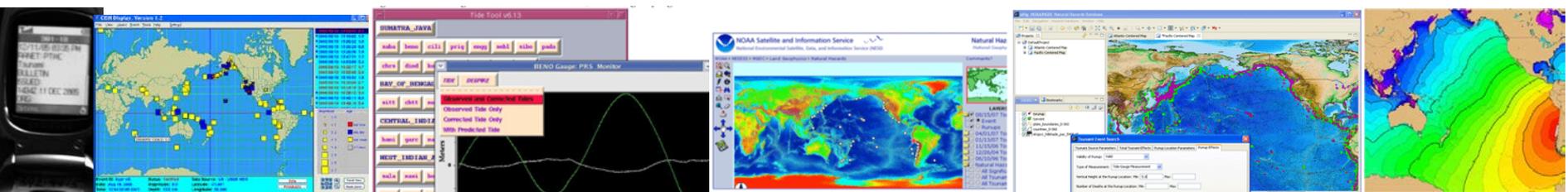
Sea Level monitoring

- **Tide Tool – TWC ops sea level monitor tool (PTWC) - since 2005**
- **IOC Sea Level Monitoring Facility – since 2008**

Tsunami Historical Database

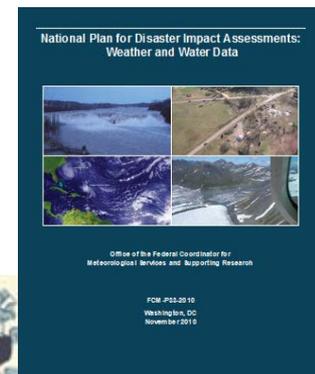
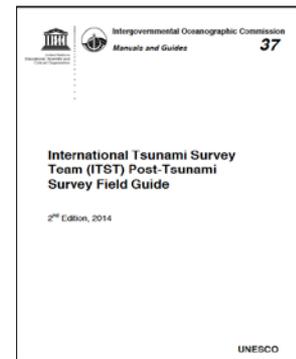
- **Online (WDS-MGG/NGDC)**
- **Offline – ITDB (NTL, 1990s) TsuDig DB GIS (NGDC ITIC, 2009)**
- **Tsunami Travel Time Software (ITIC, NGDC) – since 2007**

Further info: [ITIC, laura.kong@noaa.gov](mailto:laura.kong@noaa.gov)



ITIC Activities – Event Information

- **Global Authoritative Historical Database**
 - **Work with ICSU – World Data Service / NCEI**
- **Event Information Services**
 - **Significant Tsunami Event Site** – technical info, incl messages, observations, simulations, media
 - **List of Events – PTWC, JMA, US NTWC**
 - **Tsunami Bulletin Board list serve (450 intl) – science, no public, PTWC, US NTWC events @infolist.nws.noaa.gov**
 - **Post-Tsu Field Surveys: Intl Tsu Surv Team ITST Field Guide (IOC TS 37, 2nd ed, 2014**
 - **US Protocols – NTHMP, Federal Agency Plan**



PTWS 50th: ICG/PTWS-XXVI

USA best practices
April 20-24, 2015

- International Symposium
 - Marine Preparedness – Kevin Miller
 - HI-EMA – Doug Mayne
- ICG/PTWS-XXVI
Hawaii TWS
 - HI-EMA visit
 - Extreme Evacuation Maps Seminar



Lunchtime Seminar!

Planning for Extreme Tsunamis: Hawaii Case Study!
22 April 2015, 11:15 – 12:20 pm!
Monarch Room, Royal Hawaiian Hotel!

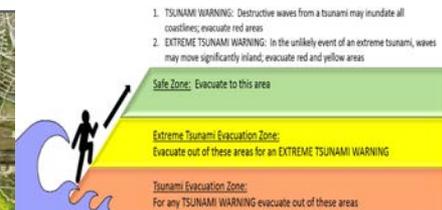
Hawaii State Emergency Management Agency!
Oahu Department of Emergency Management!
University of Hawaii at Manoa!
International Tsunami Information Center (ITIC)!

AGENDA!

Speakers!!!

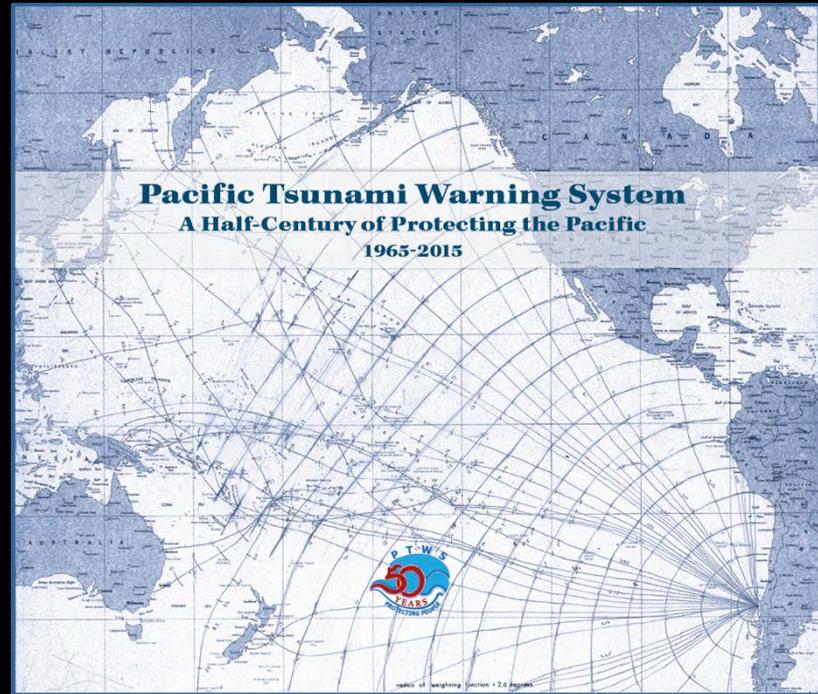
Kevin Richards, Earthquake and Tsunami Program,
Hawaii State Emergency Management Agency (HI-EMA)
Dr. Kwok Fai Cheung, Department of Ocean and Resources Engineering
University of Hawaii at Manoa
Peter Hirai, Deputy Director, City and County of Honolulu
Department of Emergency Management
Dr. Ian Robertson, Department of Civil and Environmental Engineering
University of Hawaii at Manoa

- 1:15 – 1:25 pm Welcome – Laura Kong, Director, ITIC
Planning for Tsunamis – Kevin Richards
- 1:25 – 1:40 pm Hawaii Tsunami Inundation Maps – Dr. Kwok Fai Cheung
- 1:40 - 1:55 pm Oahu Tsunami Evacuation Maps – Peter Hirai
- 1:55 – 2:10 pm Vertical Evacuation for Waikiki – Dr. Ian Robertson
- 2:10 – 2:20 pm Question and Answer and Summary – Kevin Richards



Pacific tsunami warning system: A half-century of protecting the Pacific 1965-2015

*A Historical
Commemorative
Book*



L. Kong, P. Dunbar, N. Arcos

laura.kong@noaa.gov, paula.dunbar@noaa.gov, nicolas.arcos@noaa.gov

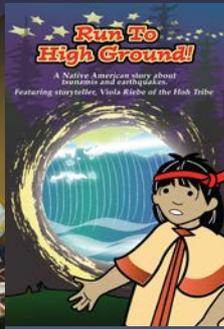
UNESCO/IOC-NOAA International Tsunami Information Center (ITIC)

NOAA National Center for Environmental Information (formerly National Geophysical Data Center)

Available US GPO : <http://bookstore.gpo.gov/products/sku/003-017-00570-4?ctid=189>

Commemorative Book: Pacific Tsunami Warning System (PTWS) A Half-Century of Protecting the Pacific 1965-2015

- Project led by ITIC with US Tsunami Program support
 - Recognize achievements of PTWS over last 50 years
 - 188 pages, >300 photos and figures
 - Editors: Laura Kong (ITIC), Nicolas Arcos Paula Dunbar (NOAA/NCEI, *formerly NGDC*)
- Global and Pacific expertise
 - ~100 people provided text, reviews, photos, figures
 - Initial input – 2014 Fall AGU



A malosi ma mata'utia te lulu o se mafu'e, pe fa'afuase'i le sami, pe faatogoina le gogolo o le sami, aga'i i nofoaga saogalemu. Mu'umu'i i faasino ala. Aus nei toe aga'i se isi i nofoaga maualalato poo sone o le saogalemu, sei vagana ua tuuna atu se faamatalaga aloaia mai le Malo e faamautiina ai ua saogalemu.



PTWS Outreach video – warning chain, M9.5 Chile

Pacific Tsunami Warning & Mitigation System

Tsunami Warning!



English: <https://vimeo.com/124650777>
Spanish: <https://vimeo.com/125109150>
French: <https://vimeo.com/125109148>



Pacific Tsunami Warning & Mitigation System

Tsunami Warning!

When a major undersea earthquake occurs near the coast, a destructive tsunami can result that will hit near-by coasts in minutes and also travel across entire oceans causing damage 1000's of kilometers away and up to 24 hours later. To alert far-away coasts, internationally coordinated tsunami early warning systems such as the Pacific Tsunami Warning and Mitigation System (PTWS) have been established to quickly provide tsunami threat information to countries.

2010 marks the 50th year of the PTWS. The System was established in 1965 in response to the 1960 M9.5 earthquake off South-central Chile that generated a tsunami which crashed the Pacific killing hundreds in Hawaii, Japan, and the Philippines. The PTWS has been built up over the decades through international cooperation and the contributions of countries and organizations under the UNESCO IOC framework.

To sustain awareness on the dangers of tsunamis, and to educate the public on how the PTWS works to disseminate information approaching tsunamis, the IOC, in cooperation with Chile, has produced a genuine outreach video. The aim of the video is to strengthen public and stakeholder agency knowledge of and confidence in tsunami alerts that save lives and reduce property damage.

This video chronicles the tsunami warning chain for a M9.5 earthquake off northern Chile as Pacific Tsunami Warning Center (PTWC) staff quickly analyze seismic and sea level data, forecast tsunami wave heights, and disseminate their threat assessments to country National Tsunami Warning Centers around the Pacific. Woven into this fast-paced video are vignettes highlighting tsunami warning and emergency response actions by centers and communities starting immediately after the earthquake in Chile and Peru, and after receiving the PTWC alerts in Samoa and Hawaii, and in Australia, Japan, Indonesia, and the Philippines.

www.tsunamivaw.info



Produced by International Tsunami Information Center (ITIC) in collaboration with the US NOAA Tsunami Program, Servicio Hidrográfico y Oceanográfico de la Armada de Chile (SHOAC), and Intergovernmental Oceanographic Commission (IOC) of UNESCO. E-mail: itc@tsunami.noaa.gov Web: <http://www.tsunamivaw.info>



Tsunamis on the move...

TSUNAMI

Run To High Ground!

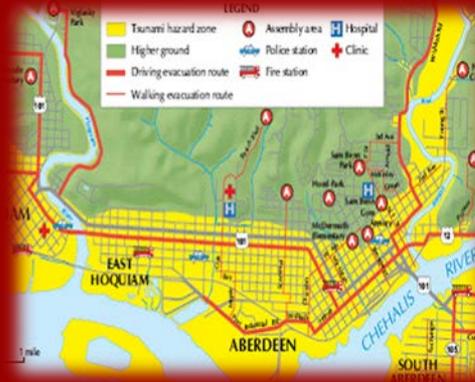
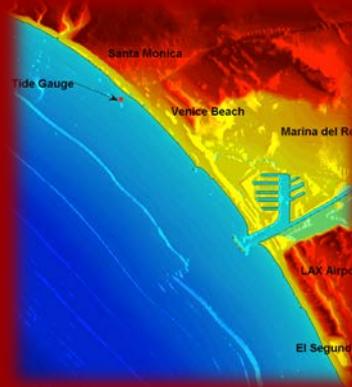
ITIC Activities - Awareness materials

Aug 2013 -April 2015, 68K copies globally

Highlights – updated or new materials

- Tsunami, The Great Waves English 2012-4
- Tsunami Glossary, Revised 2013; Addendum 2015 – NEW 2016
- Global Tsunami Sources poster, 2014
- Global Tsunami Sources icosohedron, NGDC, ITIC, 2014
- Tsunami Safety Flyers, 2013
- Surviving a Tsunami - Lessons from Chile, Hawaii, and Japan Adaptation of USGS Circular 1218 (English), 2014



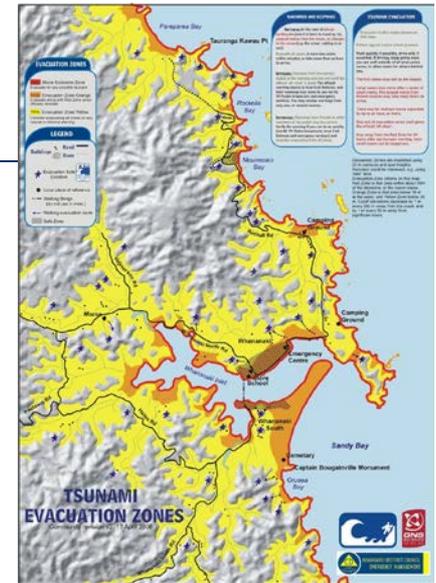


Tsunami Evacuation Maps, Plans, and Procedures (TEMPPs)

... communities knowing what to do and where to go

Course: Tsunami Evac Maps, Plans, and Procedures (TEMPP) Course

GOAL: Produce reliable tsunami evacuation maps working with communities and govt agencies.



- ❑ **Pacific and Caribbean (IOC, NOAA ITIC, CTWP, PMEL)**
- ❑ **Pilot Kick-off, June 2015 (Honduras)**
- ❑ **5 Linked training workshops, 2015-2016**
 - Inundation Modelling, Evacuation, TWC and TER SOPs (plans, procedures), Functional Community Exercise
- ❑ **Global Standard Course IOC Publication: 2017**
 - IOC Manual: Tsunami Evac Maps, Plans, Procedures
- ❑ **Pacific Island Countries**

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
- ❑ **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



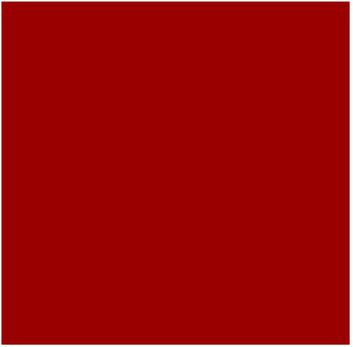
Community Preparedness is collaborative



Indonesia, I. Rafliana, 2008
ITIC, L. Kong 2013



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



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"Information Sharing Saves Lives"

Disaster Management Office

DMO

DISASTER WATCH