



## **INTERNATIONAL TSUNAMI INFORMATION CENTER (ITIC) ITIC TRAINING PROGRAMME HAWAII (ITP-HAWAII)**

### **TSUNAMI EARLY WARNING AND MITIGATION SYSTEMS ICG/PTWS PACIFIC TSUNAMI WARNING CENTER ENHANCED PRODUCTS**

**6 – 16 September 2016  
Honolulu, Hawaii USA**

#### **Overview**

Week 1 will provide an overview of the end-to-end tsunami warning system, and focus on the importance of standard operating procedures to enable rapid tsunami warning and response.

Week 2 will provide information and guidance on the PTWC New Enhanced Tsunami Forecast Products. Topics will cover advanced topics in tsunami warning center operations, and the methodologies, use, interpretation, and limitations of the new products. The changeover to the PTWC Enhanced Products for the Pacific occurred on October 1, 2014, and for the Caribbean on March 1, 2016. The PTWC no longer provide Warnings and Watches, and instead issues advisory wave forecasts. Each country must use their own warning criteria and issue their own tsunami warnings. The PTWC public text products continue, and additional graphical and statistical products are sent to PTWS and CARIBE-EWS Tsunami Warning Focal Points (TWFP).

Week 2 will also introduce several preparedness initiatives aimed at building communities that are more resilient to tsunami disasters. With PMEL, the ITIC will introduce a beta version of its Tsunami Coastal Assessment Tool (TsuCAT). TsuCAT is a database of scenarios that can be used for hazard planning, exercises, and situational awareness during events. To emphasize preparedness and knowing what to do and where to go, the ITIC, IOC and partners have developed a new training course on Tsunami Evacuation Maps, Plans, and Procedures. The course is currently being piloted in Honduras and will be available for teaching in 2017. Since 2013, the US Caribbean Tsunami Warning Program (CTWP) led in the development of an International Tsunami Ready (TR) program that motivates communities to be ready for the next tsunami. CARIBE-EWS Tsunami Ready guidelines were approved in 2015 establishing minimum tsunami mitigation, preparedness, and response standards for a community to be recognized. Pacific TR guidelines are now available and there has been interest from several countries in piloting national programs.

#### **Resource Agencies, Trainers, Support Persons:**

International Tsunami Information Center (ITIC):

Dr. Laura Kong, Director; Tammy Fukuji, IT Specialist, Art Sonen, Admin Asst.

Pacific Tsunami Warning Center (PTWC):

Dr. Charles "Chip" McCreery, Director; Dr. Stuart Weinstein, Deputy Director; Dr. Gerard Fryer, Senior Geophysicist; Dr. Dailin Wang, Senior Oceanographer; Miki Miyakuni, Admin Asst.

Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado at Boulder, and NOAA National Centers for Environmental Research (NCEI): Nicolás Arcos

NOAA Pacific Marine Environmental Laboratory (PMEL):

Marie Eble, NOAA Center for Tsunami Research

University of Hawaii at Manoa (UH):

Prof. Kwok Fai Cheung, Ocean and Resources Engineering Department

Prof. Ian Robertson, Civil and Environmental Engineering Department

Hawaii State Emergency Management Agency (HI-EMA):

Kevin Richards, Earthquake and Tsunami Planner

Ed Young, RANET Project Coordinator, former Deputy Director, NOAA NWS Pacific Region

# ITP-HAWAII 2016, 6 – 16 SEPTEMBER 2016

## PROVISIONAL AGENDA

Session	Start Time	End Time	Topic	Session Moderator, Speaker
<b>1 - 3</b>			<b>TUESDAY, 6 SEPTEMBER DAY 1</b>	Laura Kong
			<b>Opening, Country Presentations</b>	
	8:45	10:00	PICKUP OHANA WAIKIKI EAST HOTEL (OWE, Robert's yellow school bus - Laura to meet group at OWE); Pickup up Joint Base Pearl Harbor Hickam (JBPHH) base passes (Art Sonen to meet but at JBPHH Pass / ID Office); Drop at NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
<b>1.1</b>	10:00	10:15	Opening Welcome and Introductions	ITIC, PTWC
<b>1.2</b>	10:15	10:30	Programme Logistics – IRC Building, Local Transportation, Refreshment Breaks, Internet/Phone/Fax, Foreign Visitor Forms, etc	Art Sonen, Tammy Fukuji
<b>1.3</b>	10:30	10:45	Course Overview, Manual, Materials, Awareness and TW Tools	Laura Kong
	10:45	11:00	COFFEE / TEA BREAK	
<b>2.1</b>	11:00	12:30	Country Presentations (15 min each) – China, Micronesia, Malaysia, Mexico, Nauru	Participants
	12:30	13:30	LUNCH	
			<b>Country Presentations IOC, Tsunami Early Warning System Overview</b>	
<b>1.1</b>	13:30	13:40	Welcome from NWS Pacific Region	Ray Tanabe, Director
<b>2.1</b>	13:40	14:10	Country Presentations (15 min each) - Tonga, Trinidad & Tobago	Participants
<b>2.2</b>	14:10	14:40	UNESCO IOC Global Tsunami System: Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS); Roles of Tsunami National Contacts, Regional Tsunami Service Providers and Tsunami Information Centers, Tsunami Warning Focal Points, National Tsunami Warning Centers	Charles McCreery
<b>2.3</b>	14:40	15:25	End-to-end Tsunami Warning – Stakeholder and their needs, Roles and Responsibilities, Standard Operating Procedures, and their linkages	Kong
	15:25	15:40	COFFEE / TEA BREAK	
			<b>Earthquake Seismology and Tsunami Science</b>	
<b>3.1</b>	15:40	16:20	Earthquake Seismology – what, how, when, and damage earthquake causes	Stuart Weinstein
<b>3.2</b>	16:20	17:00	Tsunami Science (generation, propagation, and inundation) – what, how, when, and damage tsunami causes	Weinstein
	17:00	18:00	RETURN TO HOTEL	
<b>3 - 4</b>			<b>WEDNESDAY, 7 SEPTEMBER DAY 2</b>	Nic Arcos
			<b>Tsunami Hazard Assessment</b>	
	8:45	9:30	PICKUP OWE HOTEL (Robert's yellow school bus - Nic Arcos to ride with Group); Transport to NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
<b>3.3</b>	9:30	10:30	Tsunami Risk Assessment: Modeling and Mapping of Tsunami Inundation - Hawaii example	Kwok Fai Cheung
	10:30	11:15	COFFEE / TEA BREAK	
<b>3.4</b>	11:15	11:45	Global Historical Tsunami Database (ICSU/NCEI WDS-Geophysics, Russia NTL): Earthquake and Tsunami Statistics, Tsunami Deposits	Arcos

3.5	11:45	12:30	Global, Pacific and Caribbean Tsunami Hazards - Global Earth Model (GEM) and Global Tsunami Model (GTM)	Gerard Fryer
	12:30	13:30	LUNCH	
			<b>Tsunami Warning Center and Emergency Response (TWC/TER) - Lessons Learned</b>	
4.1	13:30	14:15	Tsunami Warning Center Overview: What do Tsunami Warning Centers (TWCs) provide to Tsunami Emergency Response (TER) agencies? Challenges in Detection and Tsunami Threat Assessment	McCreery
4.2	14:15	15:00	Lessons Learned from Past Tsunamis - Warning (Hawaii 1946-1994; Chile 1960; Nicaragua 1992 / Java 2006 / Mentawai 2010; Sumatra 2004; Tonga 2006; Samoa/Tonga 2009 (doublet); Chile 2010; Japan 2011; Bengkulu 2012; Haida Gwaii 2012; Japan 2014 and/or RIFT events, etc)	McCreery, Kong
	15:00	15:15	COFFEE / TEA BREAK	
4.3	15:15	16:00	Tsunami Emergency Response Overview: What do TER agencies provide to the Public? Challenges in Alerting, Evacuation, Safe-to-Return (All-Clear), and Preparedness	Arcos
4.4	16:00	17:00	Lessons Learned from Past Tsunamis - Response (Hawaii 1986, 1994; Samoa/American Samoa 2009; Chile 2010; Japan 2011, etc)	Arcos, Kong
	17:00	18:00	RETURN TO HOTEL	
			<b>THURSDAY, 8 SEPTEMBER DAY 3</b>	Nic Arcos
			<b>Hawaii State Emergency Management Agency visit, TWC Standard Operating Procedures (SOPs), PTWC SOPs</b>	
	8:45	9:00	PICKUP OWE HOTEL (Robert's yellow school bus - Nic Arcos to ride with Group); Transport to Hawaii State Emergency Management Agency (HI-EMA) Emergency Operations Center, Diamond Head Crater	Arcos
5.1	9:00	10:30	Visit HI-EMA: Response to PTWC Tsunami Products	HI-EMA Staff, Kevin Richards
	10:30	11:15	Transit to IRC	
6.1	11:15	11:30	IOC TWC and TER SOP Manual	Kong
6.2	11:30	12:15	SOPs and Checklists: TWC Templates and examples for Distant, Regional, and Local Tsunamis: Monitoring, Detection and Evaluation, Communications, Message Dissemination,	Weinstein
6.3	12:15	12:30	Homework - Review & improve country TWC SOP / Checklists (especially for local/regional threat)	Kong
	12:30	13:30	LUNCH	
6.4	13:30	14:00	Pacific Tsunami Warning Center SOPs - Overview: Earthquake and Sea Level Monitoring, Threat Analysis, and Forecasting, Staging, Enhanced Products	Fryer
6.5	14:00	15:00	Visit PTWC - data networks and acquisition, monitoring, analysis, quality-control/health status, communication and dissemination, redundancy, contingency/backup, etc	Fryer, McCreery
	15:00	15:15	COFFEE / TEA BREAK	
			<b>Tsunami Emergency Response (TER) SOPs</b>	
7.1	15:15	16:00	SOPs and Checklists: Warning Plans and Templates for TER Coordinated Information Flow and Evacuation	Arcos
7.2	16:00	16:45	SOPs and Checklists: Case Studies (New Zealand, Wakayama, California, Hawaii)	Arcos
7.3	16:45	17:00	Homework - Review & improve country TER SOP / Checklists (especially for local/regional threat)	Kong
	17:00	18:00	RETURN TO HOTEL	

			<b>FRIDAY, 9 SEPTEMBER DAY 4</b>	Nic Arcos
			<b>Communication and Alerting, Preparedness</b>	
	8:45	9:30	PICKUP OWE HOTEL; Transport to NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
7.4	9:30	10:30	Communication technologies for the transmission of tsunami warnings to local governments and communities – robustness, reliability, redundancy criteria for emergency communications, "Downstream" Communications Process	Ed Young
	10:30	10:45	COFFEE / TEA BREAK	
7.5	10:45	11:45	Learning Activity: Improving Response – Tsunami Warning Chain for Local Scenario - What Happens When?	PTWC, Arcos
7.6	11:45	12:30	Building Awareness and Community Preparedness - strategies and examples, Caribbean PAE Strategy and Philippines Development Process, ITIC available materials	Arcos
	12:30	13:30	LUNCH	
			<b>Preparedness, Tsunami Warning Decision Support Tools</b>	
7.7	13:30	14:15	Building Awareness and Community Preparedness - Tsunami Evacuation Planning - considerations and requirements	Arcos
7.8	14:15	15:00	Building Awareness and Community Preparedness - Tsunami Exercises and Drills, IOC Tsunami Exercise Guideline, examples	Arcos
	15:00	15:15	COFFEE / TEA BREAK	
8.1	15:15	16:00	Tsunami Warning Decision Support Tools – Overview: Message Alerts, Real-Time Earthquake Display (CISN); Sea level monitoring (Tide Tool, IOC Sea Level Monitoring web site); Tsunami Databases (WDS/NCEI web tools, TsuDig), Tsunami Travel Time (TTT) calculation	Weinstein, Fukuji
8.2	16:00	17:00	TW Tools Demo and installation - one-on-one Q&A	Weinstein, Fukuji, Kong, Arcos
	17:00	18:00	RETURN TO HOTEL	
			<b>SATURDAY-SUNDAY, 10-11 SEPTEMBER - FREE DAYS</b>	
			<b>MONDAY, 12 SEPTEMBER DAY 5</b>	Chip McCreery
			<b>Advanced TWC Topics – Earthquake Source Characterization and Monitoring, Decision Support Tools</b>	
	8:45	9:30	PICKUP OWE HOTEL; Transport to NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
8.3	9:30	10:00	TWC Operations: Real-time Earthquake Detection and Fast Source Characterization - Techniques, Use, and Limitations: Seismometers and Seismic Stations, Sparse networks and hypocentral bias	PTWC
8.4	10:00	10:45	TWC Operations: Real-time Earthquake Detection and Fast Source Characterization - Methods to determine Magnitudes (Macroscopic Intensity and Instrumental) - Limitations and Challenges	PTWC
	10:45	11:00	COFFEE / TEA BREAK	
8.5	11:00	11:45	TWC Operations: Real-time Earthquake Detection and Fast Source Characterization - Methods to determine Fault Mechanisms (Double-couple 1st motions to W-Phase Centroid Moment Tensors) - Limitations and Challenges	PTWC
8.6	11:45	12:30	Demonstration: Decision Support Tools of Monitoring, Detection, Assessment – Earthquakes: Real-time Earthquake Display (CISN), USGS web site (CMT, ShakeMap, PAGER)	Weinstein. Fukuji
	12:30	13:30	LUNCH (TW Tools installation as needed)	

			<b>Advanced TWC Topics – Tsunami Monitoring, Decision Support Tools</b>	
8.7	13:30	14:00	TWC Operations: Sea Level Monitoring - Methods, Instruments, Limitations, Challenges	PTWC
8.8	14:00	14:30	Demonstration: Decision Support Tools of Monitoring, Detection, Assessment – Tsunamis: TideTool with Tsunami Travel Times, IOC Sea Level Monitoring Facility web site)	Weinstein Fukuji
			<b>PTWC Enhanced Products, Hazard Scenarios</b>	
9.1	14:30	15:00	Pacific Tsunami Warning Center (PTWC) New Enhanced Products SOPs - Why, What, Criteria, Staging of Products	McCreery, Kong
	15:00	15:15	COFFEE / TEA BREAK	
9.2	15:15	16:30	PTWC Enhanced Products - Explanation of Each Product: Public Text, Graphical Deep-Ocean Tsunami Amplitude, Coastal Tsunami Amplitude, Coastal Tsunami Amplitude Polygons, Tsunami Amplitude Statistics, Coastal Tsunami Amplitude KMZ file	McCreery
9.3	16:30	17:00	Tsunami Hazard Scenarios around the Pacific and Caribbean – RIFT model examples	McCreery, Kong
	17:00	18:00	RETURN TO HOTEL	
			<b>TUESDAY, 13 SEPTEMBER DAY 6</b>	Laura Kong
			<b>PTWC Enhanced Products - Forecasting, NTWC and TER Guidance for Enhanced Products</b>	
	8:45	9:30	PICKUP OWE HOTEL; Transport to NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
9.4	9:30	10:00	PTWC Operations: Travel Time Forecasting - Methods, Limitations, Uncertainty, Sensitivity Studies (Location, Depth, Magnitude)	Dailin Wang
9.5	10:00	10:30	PTWC Operations: Wave Amplitude Forecasting – Methods (ATFM, SIFT, RIFT), Limitations, Uncertainty, Sensitivity Studies (Location, Depth, Magnitude)	Wang
	10:30	10:45	COFFEE / TEA BREAK	
	10:45	11:30	PTWC Operations: Wave Amplitude Forecasting – cont'd	Wang
9.6	11:30	12:30	NTWC and TER Guidance on how to use PTWC New Enhanced Products for National Warnings and Evacuation - Land and Marine Threats and Public Safety: Flow Charts, Criteria Tables, Timeline-driven SOPs, Message Templates	Kong
	12:30	13:30	LUNCH	
			<b>Improving Country SOPs for PTWC Enhanced Products, Tsunami Coastal Assessment Tool (TsuCAT)</b>	
9.7	13:30	15:00	Small Group sessions (Caribbean, Mexico, Pacific Islands, Southeast Asia): Improving Country SOPs for PTWC New Enhanced Products - Warning Communications Flow Chart, Criteria Tables, Timeline-drive SOPs for Local Scenario	ITIC, PTWC
	15:00	15:15	COFFEE / TEA BREAK	
10.1	15:15	16:45	Tsunami Coastal Assessment Tool (TsuCAT) - Pacific Database: Demonstration, Installation, Training on use	Marie Eble
10.2	16:45	17:00	Coastal Hazard Impact Tool - Feedback through Survey Monkey	Eble, Kong
	17:00	18:00	RETURN TO HOTEL	
10 - 13			<b>WEDNESDAY, 14 SEPTEMBER DAY 7</b>	Laura Kong
			<b>Marine Sector, Special Needs Populations, Structures</b>	
	8:45	9:30	PICKUP OWE HOTEL; Transport to NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
10.3	9:30	10:00	Tsunami Coastal Assessment Tool - Q & A	Eble
11.1	10:00	10:30	Tourist and Special Needs Populations Readiness	Kong
	10:30	10:45	COFFEE / TEA BREAK	

11.2	10:45	11:30	Ports and Harbors, and Marine Sector Readiness and Mitigation	Fryer
11.3	11:30	12:30	Tsunami Mitigation: Designing buildings to withstand tsunamis - FEMA P646, ASCE 7 2016 and International Building Code 2018	Ian Robertson
	12:30	13:30	LUNCH	
			<b>Making the Pacific Tsunami Ready</b>	
12.1	13:30	14:00	Implementing Tsunami Ready programs to recognize community readiness - Pacific and Caribbean guidelines; Tsunami Evacuation Maps, Plans, and Procedures (TEMPP) Course	Kong
12.2	14:00	14:30	Making Tsunami Inundation Maps (modeled and non-modeled regions) - guidance	Eble
12.3	14:30	15:00	Making Community-based Evacuation Maps - guidance	Kong
	15:00	15:15	COFFEE / TEA BREAK	
12.4	15:15	16:00	Making Community Response Plans, Signage and Outreach, and Conducting Drills - guidance	Kong
13.1	16:00	16:15	Tsunami Table Top Exercises - Decision-making using PTWC Enhanced Products - Introduction, Format, Conduct	Kong, Fryer
13.2	16:15	17:00	Tsunami Table Top Exercises – Country Preparation (SOPs, Criteria Tables, etc)	Country Teams
	17:00	18:00	RETURN TO HOTEL	
13 - 14			<b>THURSDAY, 15 SEPTEMBER DAY 8</b>	
			<b>Tsunami Exercise using PTWC products</b>	Laura Kong
	8:45	9:30	PICKUP OWE HOTEL; Transport to NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
13.3	9:30	9:45	Tsunami Table Top Exercise - setup	Kong, McCreery
13.4	9:45	11:15	Tsunami Table Top Exercise - Decision-making using PTWC Enhanced Products - Local Scenario	Kong, McCreery
	11:15	11:30	COFFEE / TEA BREAK	
13.5	11:30	12:30	Tsunami Table Top Exercise - Decision-making using PTWC Enhanced Products - Distant Scenario	Country Teams
	12:30	13:30	LUNCH	
			<b>Information Flow and Media Reporting</b>	Stuart Weinstein
13.6	13:30	14:30	PTWC Enhance Products - Question and Answer	PTWC
14.1	14:30	15:30	Media Reporting on Tsunamis (Japan media panelists)	Tohoku Univ, Yuichi Ono; Kong
	15:30	16:00	COFFEE / TEA BREAK	
14.2	16:00	17:00	Roles of Media in Warning and Mitigation Learning Activity: Improving Response - Managing Information Flow during an Event: Reliable and Unreliable Information	Kong
	17:00	18:00	RETURN TO HOTEL	
14 - 17			<b>FRIDAY, 16 SEPTEMBER DAY 9</b>	Stuart Weinstein
			<b>Emerging Tools and Technologies, Logistics wrap-up</b>	
	8:45	9:30	PICKUP OWE HOTEL; Transport to NOAA IRC (Tammy Fukuji to meet at IRC Lobby)	
15.1	9:30	10:00	Improving Tsunami Warning - Emerging Tools and Technologies: Earthquake Finite Fault Modeling	Weinstein
15.2	10:00	10:30	Improving Tsunami Warning - Emerging Tools and Technologies: Real-time GNSS/GPS detection of co-seismic deformation	Weinstein
	10:30	10:45	COFFEE / TEA BREAK	

<b>15.3</b>	10:45	11:15	Improving Tsunami Warning - Emerging Tools and Technologies: ITU/WMO/IOC SMART Cables for Observing the Ocean	Univ of Hawaii Bruce Howe, Rhett Butler
<b>15.4</b>	11:15	11:45	Improving Tsunami Warning - Emerging Tools and Technologies: To be determined	
<b>16.1</b>	11:45	12:30	ITP-Hawaii 2016 Logistics wrap-up, Ship Course Materials	Sonen, Fukuji
	12:30	13:30	LUNCH	
			<b>2017 PTWS Calendar, Summary, Closing</b>	
<b>16.2</b>	13:30	14:00	2017 PTWS Calendar: Action Items and Priorities, including: Exercise Pacific Wave 2017, JMA NWPTAC New Enhanced Products, ICG/PTWS-XXVII (Symposium and Session)	Kong
<b>16.3</b>	14:00	15:00	Summary Discussion (Way Forward, Next Steps, Gaps, Needs) - PTWC New Products, SOPs, Preparedness	ITIC, PTWC, All
	15:00	15:15	COFFEE / TEA BREAK	
<b>17</b>	15:15	15:45	Presentation of Certificates and Closing Ceremony	ITIC, PTWC, NWS
	17:00	18:00	RETURN TO HOTEL	
			<b>Friday - Saturday, 17 SEPTEMBER</b>	
			<b>Hotel Checkout - Depart for home country</b>	