Exercise South China Sea 2013
SCS-13 – Objective, Format

Dr. Laura Kong
International Tsunami Information Center

Tony Elliott
IOC Tsunami Unit
New PTWC Enhanced Products - Milestones

- **Changeover:** October 1, 2014 (approved by ICG/PTWS-XXV, 2013)
  - PTWC cease issuing existing products (text, Warning/Watch)
  - PTWC start issuing new enhanced products with amplitude wave forecasts

- **Current Service, since 15 April 2013:**
  - PTWC issuing experimental products in parallel with existing
  - PTWC existing products take priority

- **Updated PTWC New Products Users Guide,**
  target February, 2014

- **Intl Regional Training,** Country training as needed

- **IOC Circular Letter announcing changeover at least 30 days before**
New PTWC Enhanced Products - Public

- Public Text product continues (by GTS, AFTN, fax, email, EMWIN, website) – improved, easier-to-read format

- Product Content
  - Forecast Polygons with maximum tsunami amplitudes of: <0.3m, 0.3 to <1m, 1 to < 3m, ≥3m
  - Forecast arrival times at designated forecast points
  - Measurements of observed tsunami waves
  - General response guidance

- Issued hourly or sooner if new information
New PTWC Enhanced Products - Private

- Other Text Products (by email to TWFP)
  - Table of forecast statistics

- Graphical products (by email to TWFP)
  - Coastal Tsunami Amplitude Forecast Polygon map
  - Coastal Tsunami Amplitude Forecast Points map
  - Deep-Ocean Tsunami Amplitude Forecast map
  - Tsunami Amplitude Forecast Points – KMZ-format file
GUIDANCE:
FORECAST => WARNING => EVACUATION

- Amplitude $\geq 3$ m  
  $\Rightarrow$ Major Land Threat:  
  Evacuate Tsunami Coastal Evacuation Zones

- $1$ m $\leq$ Amplitude $< 3$ m  
  $\Rightarrow$ Land Threat:  
  Evacuate Tsunami Coastal Evacuation Zones

- $0.3$ m $\leq$ Amplitude $< 1$ m  
  $\Rightarrow$ Marine Threat:  
  Clear beaches, harbors, low lying coastal areas

- Amplitude $< 0.3$ m  
  $\Rightarrow$ No Threat, No Evacuation

- Value not computed  
  $\Rightarrow$ Monitor Event
Marine Threat

Eddies generated by the interactions of tsunami waves as they hit the coast of Sri Lanka, 26 December 2004. Photo courtesy of Digital Globe.
Kesennuma, 11 March 2011 –
Land / Marine Threat ? - Fast flowing debris
Minor Land Threat
Major Land Threat
Exercise South China Sea 2013
SCS-13

Dr. Laura Kong
International Tsunami Information Center

Tony Elliott
IOC Tsunami Unit
GOAL AND OBJECTIVES

GOAL: SCS-13 to simulate decision-making on

- Issuance of Warning, or not, and where
- Upgrade of Warning, or not
- Continue, Cancel, Downgrade Warning;
  Criteria for Search and Rescue, Public All-Clear

Activities are:

- Time 0 - 15 min: TWC EQ Monitoring and Early Source Characterization, Hazard Decision-making
- Time 15 - 60 min: TER Risk Decision-making, Evacuation
- Time hrs - days: TER Search-and-Rescue, Safe-to-Return
FORMAT

1. Table top Exercise – 90 min
2. Each Groups discusses and act on Injects (PTWC/JMA bulletins, Situation Report)
3. 3 Injects corresponding to 3 times after EQ occurrence (OT+13 min, OT+45 min, OT+1.5-5 hrs)
4. For each Inject, Group will
   - Receive Inject and Questions to Answer
   - Assess and discuss situation and response. Document response. Answer Questions - 15 min
   - Report Back in Plenary - 15 min
Minami-sanriku, 11 March 2011 –
5 minutes from feeling safe to wave attack
INJECT 1

1. Origin Time + 13 minutes
2. PTWC Bulletin 1
3. NWPTAC NWPTA 1
4. Situation Report
   - Eyewitness Observation - shaking lasted 2 min
   - PTWC minimal forecast
1. What actions does your country take? There is no quantitative PTWC forecast in the first message, but there is a NWPTAC forecast?

2. Do you wait for a second message from PTWC, hopefully with a quantitative forecast, before issuing a message and instructing the public?
INJECT 2:
PTWC BULLETIN 2
MODEL RUN 1
PTWC Deep-Ocean Tsunami Amplitude Forecast
(Actual deep-ocean amplitudes may vary from forecast amplitudes due to uncertainties in forecast assumptions.)

Model Run 1

Earthquake:
21 Dec 2013
00:00:00 Z
Lat: 20.50°N
Lon: 121.00°E
Depth: 20 km

Maximum Amplitude (m)
- 9.98
- 1.00
- 0.75
- 0.50
- 0.25
- 0.10
- 0.05
- 0.01
- 0.00

Computed Mechanism

Model run at:
12 Dec 2013
13:41:39 Z
PTWC Coastal Tsunami Amplitude Forecast

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

Model
Run 1

Earthquake:
21 Dec 2013
00:00:00 Z
Lat: 20.50° N
Lon: 121.00° E
Depth: 20 km
$M_W$ : 8.5
CMT:

Computed Mechanism

Maximum Amplitude (m)

6.62
3.00
1.00
0.30
0.00

Model run at:
12 Dec 2013
13:41:39 Z
PTWC Coastal Tsunami Amplitude Forecast

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

Model
Run 1
Earthquake:
21 Dec 2013
00:00:00 Z
Lat: 20.50° N
Lon: 121.00° E
Depth: 20 km
$M_w = 8.50$
CMT:

Computed
Mechanism

Maximum Amplitude (m)

- > 3 m
- 1 - 3 m
- 0.3 - 1 m
- < 0.3 m

Value Not Computed

model run at:
12 Dec 2013
13:41:30 Z
INJECT 2

1. Origin Time + 45 minutes
2. PTWC Bulletin 2
3. NWPTAC NWPTA 2
4. Situation Report
   - PTWC / NWPTAC: no tsunami waves observations reported yet
   - PTWC forecast provided
1. Did the quantitative forecast prompt or change your course of action?

2. Did you determine which parts of the coast might be hardest hit and is that information actionable?

3. What information from the forecast, if any, would you be likely to disseminate to the public?
INJECT 3

1. Origin Time + 1.5 to 5 hours
2. PTWC Bulletins 3, 4, 5, 6
3. NWPTAC NWPTA 3, 4, 5, 6
4. Situation Report
   - Tsunami Waves have hit coasts
   - PTWC, JMA observations reported
1. What actions were taken while waiting for the tsunami impact?

2. What criteria will you use to determine if you should cancel the warning?

3. What criteria will you use to determine if it is safe for the Public to return to the evacuated zone (All-Clear)?

4. What are procedures you will use to issue the All-Clear?
Thank You

Dr. Charles McCreery
Director, Pacific Tsunami Warning Center

Dr. Laura Kong
Director, International Tsunami Information Center