Keeping Authorities Informed: Available TW Decision Support Tools
Alert, Sea Level, Earthquakes, Historical Database, Tsunami Travel Times

Nicolás Arcos
UNESCO/IOC – NOAA International Tsunami Information Center
IOC, USGS, PTWC, WDS-Geophysics, RANET
Tsunami Warning Decision Support Tools (ongoing):

- Heads-up SMS TW Alert (NOAA/USAID RANET, PTWC) – since 2005
- Tsunami Bull Board (ITIC) – since 1995, curr ~444 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-Geophysics/NGDC)
- Offline - TsuDig Global DB GIS, multi-platform (NGDC, ITIC) - since 2009
- Tsunami Travel Time Software (ITIC, NGDC) – since 2007

Further info: ITIC, laura.kong@noaa.gov
Information Feeds
(currently PTWC, but expand to other warning centers for cyclones, etc.)

Commercial Gateway
(near ‘global’ coverage where cell phone or satellite phone services exist)

RANET Servers
(receive messages and process to ensure security, backup, and place in appropriate SMS format)
What the SMS system IS NOT:

- Not meant to replace existing and formal/official means of communicating alerts or critical information.

- Not meant to become the sole means of receiving critical alert information – warnings and communication should come through a ‘layered’ approach.

- Not meant to be mass-public communication system for national official / disaster managers, international organizations needing to be notified

- Coverage: Global – All Oceans

- Pilot - contact laura.kong@noaa.gov, raw-sma@ranetproject.net
Email List-serve, Currently, ~444

Membership: Scientists, Tsunami prof, govt, NO MEDIA - NO PUBLIC

Features
1. Immediate delivery
2. No censorship
3. Forum for sharing science and early results - NOT peer-reviewed
4. PTWC, US NTWC tsunami messages

Contact: itic.tsunami@noaa.gov
Real-Time Earthquake Display and Alert System (CISN)

- Internet
- Passive (automatic receive)
- Multi-platform
- EQ broadcast
- Alert system (SMS, email)
- GIS layers
- Tsunami Warning msgs

Sign-up - Contact: itic.tsunami@noaa.gov
Subject: Expanding Regional Warning - Initial
Date: Fri, 11 Mar 2011 05:56:02 +0000 (GMT)
From: Pacific Tsunami Warning Center <ptwc@ptwc.noaa.gov>
Reply-To: ITIC Tsunami Bulletin Board <tsunami_bb@infolist.nws.noaa.gov>
To: ITIC Tsunami Bulletin Board <tsunami_bb@infolist.nws.noaa.gov>

ITIC Tsunami Bulletin Board
TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 0555Z 11 MAR 2011

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON AND CALIFORNIA.

...A TSUNAMI WARNING AND WATCH ARE IN EFFECT...

A TSUNAMI WARNING IS IN EFFECT FOR
JAPAN / RUSSIA / MARCUS IS. / N. MARIANAS
TideTool - Interactive Sea Level Monitoring
(OPERATIONAL Tool for Tsunami Warning Centres)

- PTWC-received sea level stations (GLOSS, non-GLOSS)
- Decode, Display, Manipulate (expand, measure period/amplitude) satellite-transmitted sea level data
- Open-source shell programming, graphics (Tcl/Tk, BLT extension), PC, Linux, Unix
- Continuously decodes: expand time series, remove tide, pick amplitude, metadata, msg, Downloads data from GTS (Met Svc)
  Also by ftp from NOAA NWS gateway
- Runs locally (data, software)
- Dynamic, interactive, customize

Contact: stuart.weinstein@noaa.gov, laura.kong@noaa.gov
Tide Tool: 27 February 2010
IOC Sea Level Monitoring Facility
http://www.ioc-sealevelmonitoring.org/map.php

- **Global Monitoring** of satellite-transmitted data (Station health)
- **Easy-to-use Web tool** (runs in Belgium, not locally)
  Uses Internet (could become clogged during real event)
- **Continuously downloads to site:** from GTS and other sites
- **Continuously decodes:** displays / expand time series, station metadata, messages
- **Data download manually**
Global Historical Databases

- **WDS-Geophysics/NGDC**
  online - Web online
  offline – TsuDig (2009)
- **ITDB** – Russia
  offline (1990s)

**Features:**
- GIS display
- EQ, Tsunamis, Run-ups
- Seismic, Sea Level networks
- Event sorting
- Travel Times

Contact: itic.tsunami@noaa.gov
TsuDig: GLOBAL HISTORICAL DB TOOL
Offline GIS (v1.1, Aug 2013)

- Uses WDS Tsunami DB (NOAA NGDC)
- Pacific or Atlantic centered
- Tsunamis and significant earthquakes
- Multiple search criteria: Events, Runup
- Results displayed on map and viewed in table format
- Map Symbols customizable to show different parameters (color, symbol)
- Users can import own data
- Tsunami travel times

Contact: paula.dunbar@noaa.gov, laura.kong@noaa.gov
Tsunami Travel Time Calculation and Map Display

- PC-Windows, Linux, Unix, Mac OSX
- Calculation
- Map display (GMT)
- Used by PTWC
- Examples, Simple scripts
- Accuracy on bathymetry Etopo1 (1-min) and coarser grids
- Available to TWFP / govt agencies

Contact: paula.dunbar@noaa.gov, laura.kong@noaa.gov
A NATIONAL TWC SOP

1. RECEIVE EQ INFO
   - Heads-up SMS TW Alert, Tsunami Bull Board, RTED / CISN
   - National TWC alarm (national network), Feel shaking, Phone call
   - International Regional TWC (PTWC, JMA, RTSP IOTWS, other)

2. IF LARGE EQ, THEN ISSUE TSUNAMI MESSAGE

3. DETERMINE WHEN TSUNAMI WILL ARRIVE (automate)
   - TsuDig, TTT (sea level stations, towns)
   - National Tsunami DB (gives arrival times)

4. DETERMINE HISTORICAL TSU HAZARD – QUERY DB
   - Tsunami Historical Database (TsuDig)
   - National Tsunami TB
   - Pre-computed Inundation Scenarios, Real-time forecast

5. MONITOR SEA LEVEL STAS TO CONFIRM TSUNAMI
   - Tide Tool, IOC Sea Level Monitoring Facility

6. RECEIVE AND ISSUE MORE INFO (updated EQ, better forecasts, tsunami obs), INFORM MEDIA

7. CANCEL WHEN NO DAMAGING TSUNAMI WAVES
ITIC – Tsunami Warning Tools

• Real time Earthquake Display / California Integrated Seismic Display (USGS) (real-time)

• Sea Level monitoring (real-time)
  – Tide Tool – TWC sea level monitor (PTWC)

• Tsunami Historical Database (NGDC, ITIC)
  – TsuDig DB GIS tool – offline
  – Tsunami Travel Time Software
TWTools Software

- Software installation assistance available
- Schedule before or after training
Thank You

Nicolás Arcos
UNESCO/IOC – NOAA International Tsunami Information Center

IOC, USGS, PTWC, WDS-Geophysics, RANET