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

Laura Kong
UNESCO/IOC – NOAA International Tsunami Information Center
IOC, USGS, PTWC, WDS-Geophysics, RANET
ITIC – Tools

**Tsunami Warning Decision Support Tools (ongoing):**

- **Heads-up SMS TW Alert (NOAA/USAID RANET, PTWC) – since 2005 N/A**
- **Tsunami Bull Board (ITIC) – since 1995, curr ~450 science/tsu/govt**
- **Real time Earthquake Display / California Integrated Seismic Network Display (USGS, NTHMP) – since 2005, curr >250**
- **Sea Level monitoring**
  - Tide Tool – TWC ops sea level monitor with TTT (PTWC) - since 2005
  - IOC Sea Level Monitoring Facility – since 2008

**Tsunami Historical Database**

- **Online (WDS-MGG/NGDC)**
- **Offline - TsuDig Global DB GIS, multi-platform (NGDC, ITIC) - since 2009**

- **Tsunami Travel Time TTT Software (ITIC, NGDC) – since 2007**

*Further info: ITIC, laura.kong@noaa.gov*
Email List-serve, Currently, ~450

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

Features
1. Immediate delivery
2. No censureship
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 Forum for sharing science and early results - NOT peer-reviewed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
CISN: 11 March 2011

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
Iquique, Chile
4.4 m Peak-to-Trough
~18 min period

Pisagua, Chile
3.3 m Peak-to-Trough
~10 min period

Tide Tool: 1 April 2014
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

![Screenshot of monitoring tool](image.png)

- **Station metadata**
  - Code: Sibolga
  - Country: Indonesia
  - Location: Sibolga
  - Status: Operational
  - Operator: INESRTED
  - Contact 2: UNLG
  - Latitude: 1.7333
  - Longitude: 99.8
  - Connection type: GTS message

- **Sensor data**
  - Sensor 1:
    - Type: tide
    - Sampling rate (min): 1
  - Sensor 2:
    - Type: tide
    - Sampling rate (min): 1
  - Sensor 3:
    - Type: tide
    - Sampling rate (min): 1

![Map showing station locations](image.jpg)

- Site developed and maintained by LDEO for UNESDG/IOC (Latvia).
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
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
1. RECEIVE EQ INFO
   - **RTED / CISN, Tsunami Bull Board** - Tsunami Service Providers (PTWC, JMA, IOTWS TSP, others)
   - **National alarm** (seismic network), Feel shaking, Phone call

2. IF LARGE EQ, THEN QUICKLY ISSUE TSUNAMI MESSAGE

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

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

5. MONITOR SEA LEVEL STATIONS TO CONFIRM TSUNAMI
   - **Tide Tool, IOC Sea Level Monitoring Facility**
   - **National Sea Level network**

6. RECEIVE / ISSUE MORE INFO (update EQ/forecast, observ), INFORM MEDIA

7. CANCEL WHEN NO DAMAGING TSUNAMI WAVES
Thank You

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