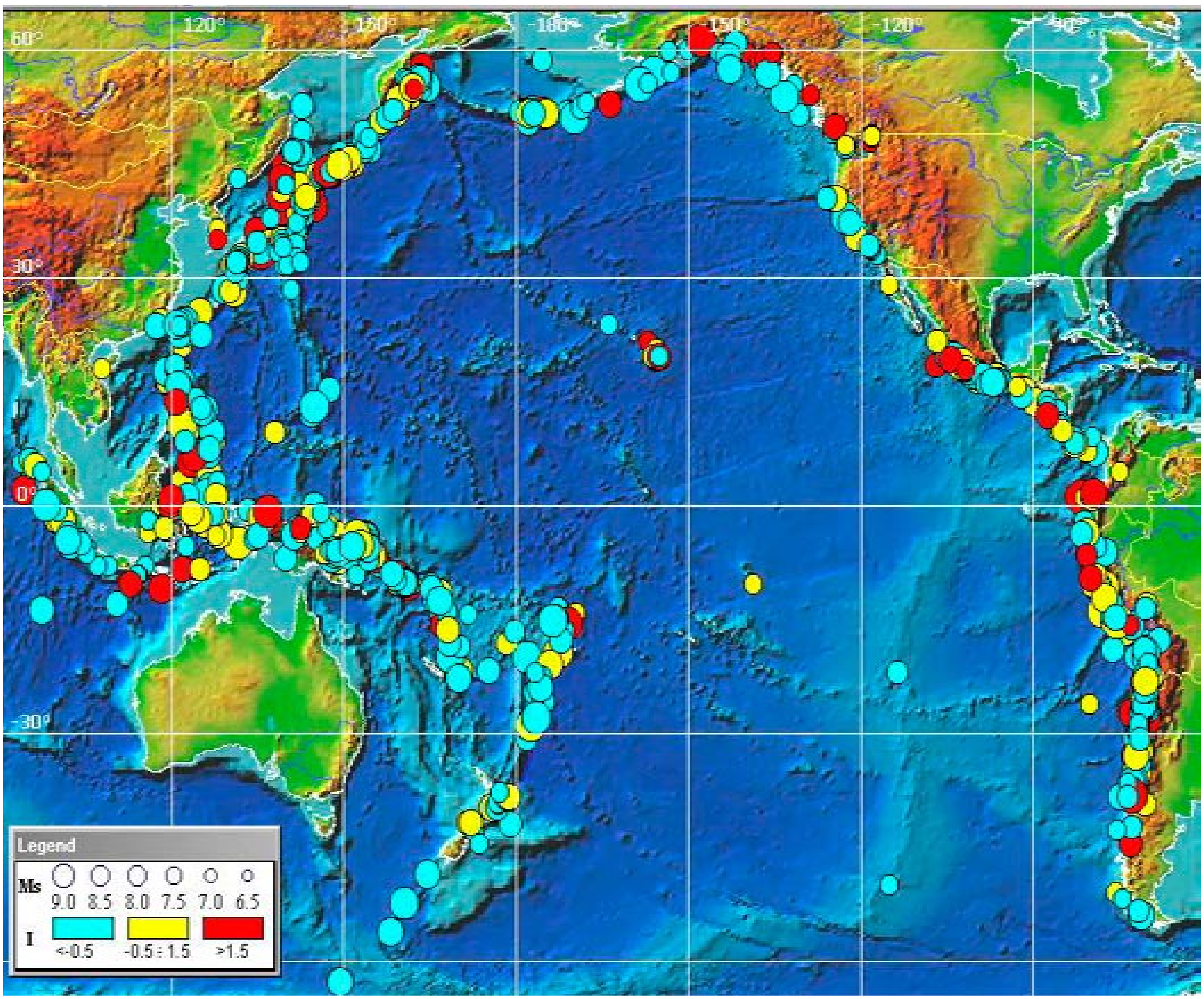
August 2002 Volume XXXIV, Number 4

Tsunami Newsletter

INTERNATIONAL TSUNAMI INFORMATION CENTER - ITIC

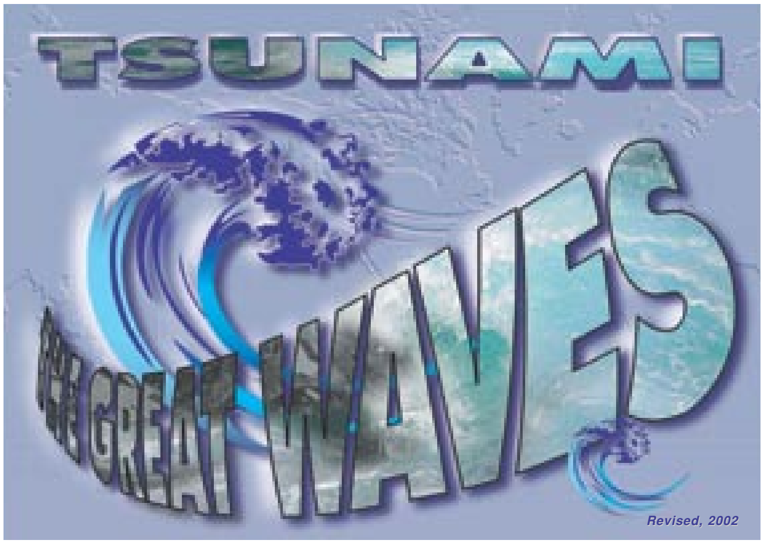


Historical map of 731 tsunamigenic events occurring in the Pacific between 1901-2000. Circle size is proportional to the event's surface wave magnitude, M_S. Circle color represents the tsunami size as determined by its intensity on the Soloviev-Imamura scale, and is grouped into three categories – observable (blue), perceptible (yellow) and damaging (red) tsunamis. Data from the Historical Tsunami Database for the Pacific Ocean. See page 10 for more information.

SUMMARY OF EARTHQUAKES IN THE PACIFIC
Occurring June-July 2002

With surface wave (M_S) or moment magnitude (M_w) greater than or equal to 6.5 and a depth no greater than 100 km, or an event for which a Tsunami Information Bulletin (TIB) or Regional Watch Warning (RWW) was issued. Epicenter from USGS/NEIC (G); preliminary M_s from PTWC (P) at time of action; and depth from Harvard (H).

DATE	LOCATION	TIME (UTC)	LAT.	LONG.	DEPTH (km)	M_S	M_W	PTWC ACTION	ACTION (UTC)	Tsunami ?
17 June	Vicinity of Santa Cruz Islands	21:26	12.59 S	166.38 E	48.3	6.5 (P) 6.7 (G)	6.6 (G) 6.7 (H)	TIB	22:07	NO



Enclosed with this issue of the **Tsunami Newsletter** is a copy of ***Tsunami, The Great Waves.*** It has ben revised to include coverage of recent tsunamis and to reflect changes to the warning system.

For additional copies, contact ITIC (contact information on the back page).

PTWC NEWS

PTWC and WC/ATWC implement new product codes

On July 31, 2002 at 20:00 UTC, new tsunami product codes used by the Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) and the West Coast /Alaska Tsunami Warning Center (WC/ATWC) went into effect. This action was initiated to make the tsunami product identifiers more consistent with other U.S. National Weather Service products, to coordinate product codes between the two U.S. Warning Centers (PTWC and WC/ATWC), to eliminate obsolete products, and to create identifiers for existing and new products. During implementation and testing of the new identifiers, weak links in the communication chain were identified and strengthened. WMO (World Meteorological Organization) and NOAA Weather Wire (NWW) recipients should note the changes in the Product Inventory List (PIL), and AWIPS users (Automated Weather Information Processing System), primarily U.S. National Weather Service offices, will need to modify terminal settings to receive the new products. The Warning Centers will next be developing "public friendly" products (shaded in Table) for input onto the NOAA weather radio, and into other public dissemination channels. The table on the following page shows the new identifiers. It was provided by Bruce Turner (communications point of contact at WC/ATWC).

TSUNAMI PRODUCT CODES
effective July 31, 2002

Old product codes in parentheses

	WMO Headers	NWW PIL internal use only	AWIPS ID	Message Explanation
Originated by PTWC	WEPA40 PHEB	HFOTSUPAC (HNLTSUCP)	TSUPAC (TSUCP)	Tsunami Warning [Pacific > 7.5]
	WEPA42 PHEB	HFOTIBPAC (HNLTSUCP)	TIBPAC (TSUCP)	Tsunami Information Bulletin [Pacific 6.5 to 7.5]
	NTXX98 PHEB (NTPA40 PHEB)	HFOTSTMSG (NTCTSTMSG)	TSTMSG	Test Message
	NTXX99 PHEB (NTPA40 PHEB)	HFOTSTHEB	TSTHEB	Test Message
	WEHW40 PHEB	HFOTSUHWX	TSUHWX	Tsunami Warning for Hawaii Civil Defense
	WEHW42 PHEB	HFOTIBHWX	TIBHWX	Tsunami Information Bulletin for Hawaii Civil Defense
	SEHW70 PHEB	HFOEQIHWX	EQIHWX	Information Message [Hawaii < 6.5]
	WEHW50 PHEB	HFOTSUHW1	TSUHW1	Public Tsunami Warnings [Pacific > 7.5]
	WEHW52 PHEB	HFOTIBHW1	TIBHW1	Public Tsunami Information Bulletin [Pacific 6.5 to 7.5]
Originated by WC/ATWC	WEPA41 PAAQ	ANCTSUWCA (ANCTSUPAQ)	TSUWCA (TSUPAQ)	Tsunami Warnings [U.S. Alaska & West Coast, British Columbia, Canada > 7.0]
	WEPA43 PAAQ (WEPA41 PAAQ)	ANCTIBWCA (ANCTSUPAQ)	TIBWCA (TSUPAQ)	Tsunami Information Bulletin [U.S. Alaska & West Coast, British Columbia, Canada 6.5 to 7.0]
	SEAK71 PAAQ (SEAK42 PAAQ)	ANCEQIAKX (ANCPNSPAQ)	EQIAKX (PNSPAQ)	Information Message [U.S. Alaska < 6.5]
	SEUS71 PAAQ (WEPA43 PAAQ)	ANCEQIWOC (ANCTSMPAQ)	EQIWOC (TSMPAQ)	Information Message [U.S. West Coast & British Columbia, Canada < 6.5]
	NTXX98 PAAQ NTPA40 PHEB)	ANCTSTMSG (PAQTSTMSG)	TSTMSG	Test Message
	NTXX99 PAAQ (NTPA40 PHEB)	ANCTSTAAQ	TSTAAQ	Test Message
	WEAK51 PAAQ	ANCTSUAK1	TSUAK1	Public Tsunami Warnings [U.S. Alaska & West Coast, British Columbia, Canada > 7.0]
	WEAK53 PAAQ	ANCTIBAK1	TIBAK1	Public Tsunami Information Bulletin [Pacific 6.5 to 7.5]

EVOLUTION OF THE TSUNAMI WARNING PLAN IN FRENCH POLYNESIA AND TSUNAMI WARNING EXERCISE IN THE MARQUESAS ISLANDS

contributed by Dominique Reymond (reymond.d@labogeo.pf) & Olivier Hyvernaud (hyvernaud@labogeo.pf)
CEA/DASE/LDG Tahiti, P. O. BOX 640 Papeete, Tahiti, French Polynesia

Summary:

The CPPT (Centre Polynesien de Prevention des Tsunamis) is in charge of tsunami warnings for French Polynesia. Because of the high risk of tsunamis in this mid-Pacific region, a tsunami warning system was first developed in the 1960s, and its tsunami detection and evaluation techniques continually improved over the years. This past year, the Civil Defense re-evaluated and revised the old tsunami emergency plan, which had been in operation since the 1980s, and with CPPT, conducted a two-day tsunami warning exercise in the Marquesas Islands.

Evolution of the local tsunami warning system

Historically, the main techniques used by CPPT for tsunami warning were the following:

- At its inception, two parameters, the surface wave magnitude (Ms) and the T wave duration, were used. However, these methods were not fully satisfactory because the different thresholds for issuing warnings based on T wave duration were rather complicated, and this system was not able to detect slow earthquakes since this type of earthquake excited only small T waves. Additionally, an automated analog seismic warning was based on duration and amplitude calculations from short-period P waves, and false warnings were possible from small deep earthquakes which generated large, short-period P waves.
- Starting in 1985 and continuing through the 1990s, CPPT used the mantle magnitude, Mm (Talandier & Okal [3], [4]) for tsunami warnings. In this method, a measure of Mm was done in the time domain by picking the amplitude and period on paper long-period records, and entering this value on a computer to obtain Mm and Mo (scalar moment) using a very simple relation between Mo and Mm (Log_{10} Mo = Mm + 13., where Mo is in Newton meters, N.m.). In 1987-1988, the first real time processing was developed, thus enabling the automatic picking of the main seismic waves (P, S, Rayleigh, Love), location of the epicenter, and computation of Mm in the frequency domain.
- In the 1990s, the real time processing was transferred onto PCs (Personal Computers), and the TREMORS (Tsunami Risk Estimation through seismic MOment with a Real time System) was developed as a seismic warning system (as described in [5] and other references). This system uses a single three-component station, triggers on P waves, provides an automatic location (using automatic picking of the P, S, R, L phases to determine source epicentral distance from the station, and the particle polarization from the three components to determine source azimuth), and computes the scalar seismic moment via the computation of mantle magnitude, Mm.
- Since 1995, TREMORS has been adapted and improved to work on a new multi-tasking operating system (Windows NT). Previously, TREMORS was run for several years under a single-task operating system, and under the limited-memory DOS environment.

Present CPPT Tsunami Warning System

Presently, tsunami warnings are issued by CPPT when thresholds are exceeded for a signal/noise ratio (STA/LTA) on the P wave or the magnitude of the seismic moment; typically these warning thresholds are Mo greater than $1.0x10^{20}$ N.m., corresponding to magnitude 7 or larger, and a STA/LTA greater than 50. The warning threshold for the seismic moment, Mo, gives very reliable results, even for slow earthquakes which are characterized by their very small P wave amplitude excitation (recent examples were the June, 1994, Java earthquakes, and the Feb., 1996, Peru earthquake).

EVOLUTION OF THE TSUNAMI WARNING PLAN..., *continued*

To date, TREMORS has been installed in France, Portugal, Mongolia, and Great Britain, and the results of these stations are now sent by e-mail, to our Laboratory. The results from the stations are then averaged, thus improving our estimation of Mo since the averaging has the effect of smoothing the nodes and maximum lobes of the surface wave radiation pattern. The Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) has also installed the TREMORS system and uses the averaging technique for Mm and Mo estimation.

For big earthquakes, CPPT's goal will be to compute the seismic moment tensor. In this project, RDFM (Rapid Determination of Focal Mechanism, [6]), the moment tensor is computed from the inversion of the surface waves spectra (Rayleigh and Love), which are received by E-mail from TREMORS stations or computed after an AUTODRM request from DASE or the IRIS database (Figure 1). RDFM results are currently available on the EMSC (Euro-Mediterranean Seismological Center) internet site (http://www.emsc-csem.org).

```
************************************
Moment tensor solution (RDFM) :
origin time 13:56 18-JUN-2002
Region CHILE
Lat 31 S Lon 071 W Dep 060
Half-duration   4.6 sec
Moment tensor (scale 10**18 Nm):
Mrr=+4.88 7.06 Mdd=+2.45 3.89
Mff=-7.33 3.89 Mrd=+0.78 3.58
Mrf=-2.42 3.00 Mdf=-2.02 0.94
Principal axes (scale 10**18 Nm):
(T) Val=-8.11, Plg=066, Azm=033
(N) Val=+2.34, Plg=022, Azm=186
(P) Val=+5.77, Plg=010, Azm=280
Best double couple: Mo=6.9*10**18
NP1: Strike= 35 Dip= 40 Slip=126
NP2: Strike=172 Dip= 58 Slip= 64

**********************************
```

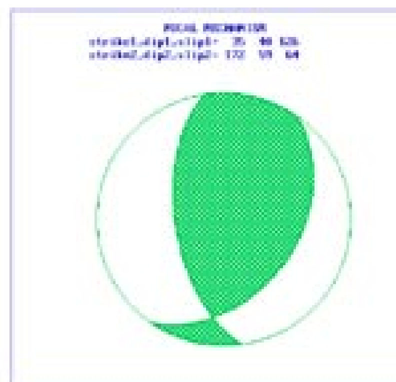


Figure 1. Example of focal mechanism determination (RDFM project), with moment tensor results, in a format similar to that of the Harvard CMT (left), and the corresponding focal sphere (right).

In addition, the E/Mo ratio, where E is the energy of the P wave, is calculated, and the criteria given by Okal & Newman [2], used for determining whether the event corresponds to a "slow" earthquake or not (Figure 2).

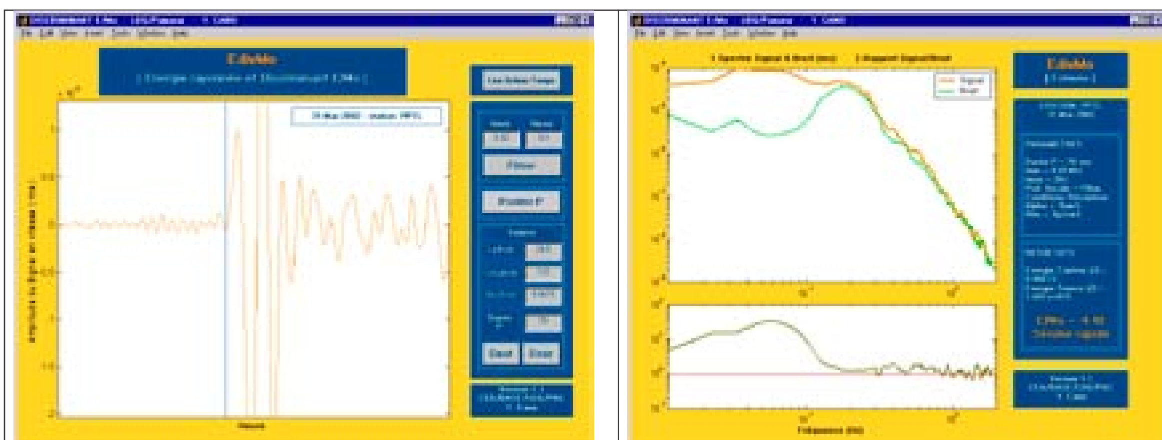
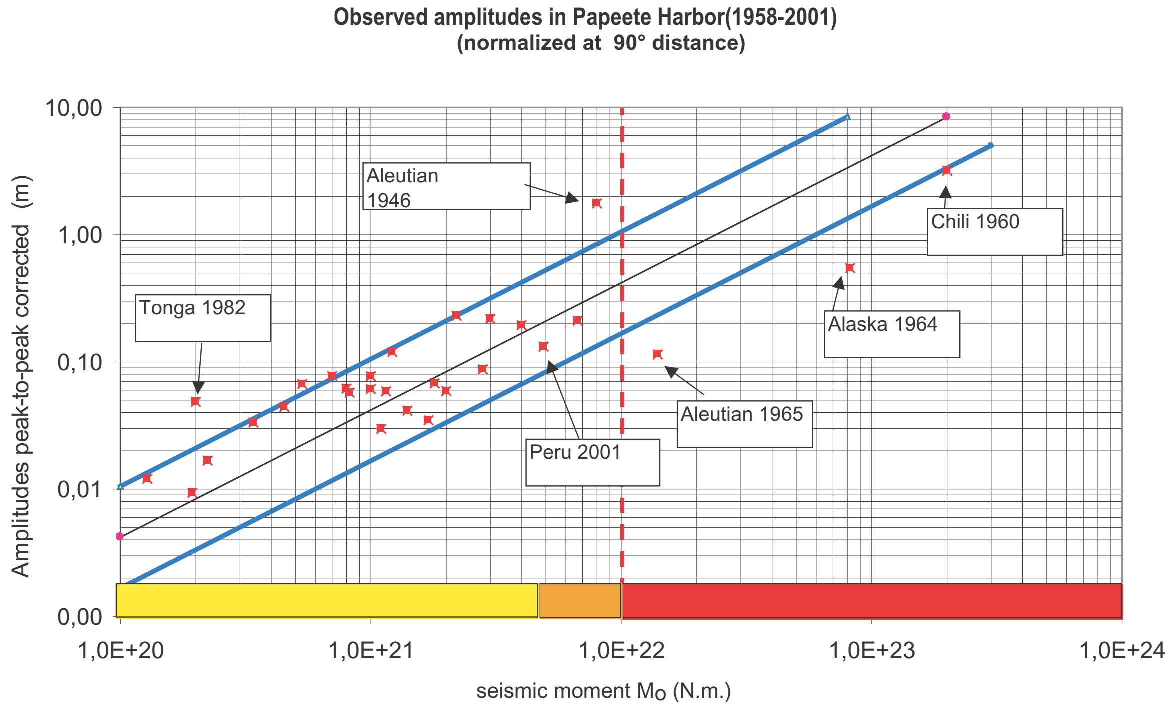


Figure 2. Example of E/Mo with graphical interface determination. In the left frame, we pick the P wave and enter the earthquake coordinates and Mo. The results are displayed in the right frame, which shows the spectra of noise and the P wave, and their spectral ratio. Finally, the earthquake is judged as rapid or slow as a function of the ratio E/Mo.

EVOLUTION OF THE TSUNAMI WARNING PLAN..., *continued*

After this step, the estimation of the tsunami amplitude is calculated from the M_O for three sites: Papeete Harbor, Taiohae Bay (Nuku Hiva, Marquesas Islands), and Rikitea (Gambier Islands). The research methodology used to estimate tsunami amplitude is based on empirical studies started in Papeete Harbor by Talandier & Okal [7] and extended to Nuku Hiva and Rikitea (Figure 3).



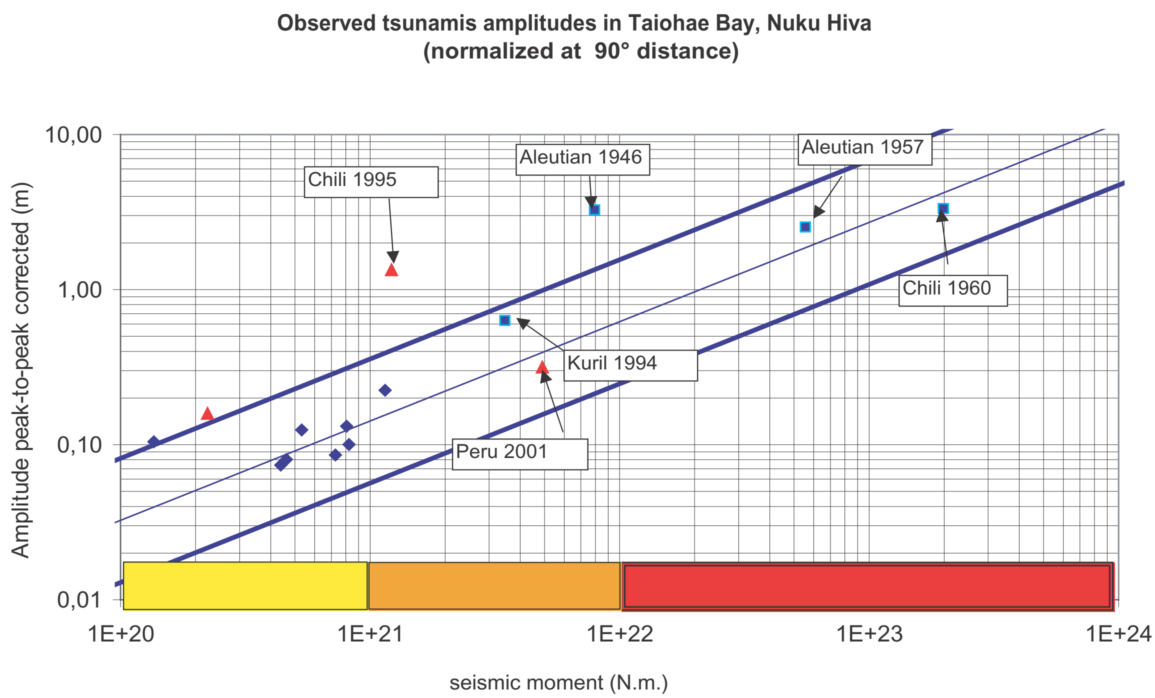


Figure 3 gives the relation between tsunami amplitude and seismic moment for Papeete Harbor (top) and Taihoae Bay in Nuku Hiva (bottom). The color scale (YELLOW, ORANGE, RED), corresponding to the level of warning, is shown at the bottom of each picture. Note that the experimentally-determined slopes are not the same for Nuku Hiva and Papeete.

EVOLUTION OF THE TSUNAMI WARNING PLAN..., *continued*

CPPT also uses water level data received from PTWC from tide gauges at several points available in the Pacific (Figure 4) to confirm whether a tsunami has been observed.

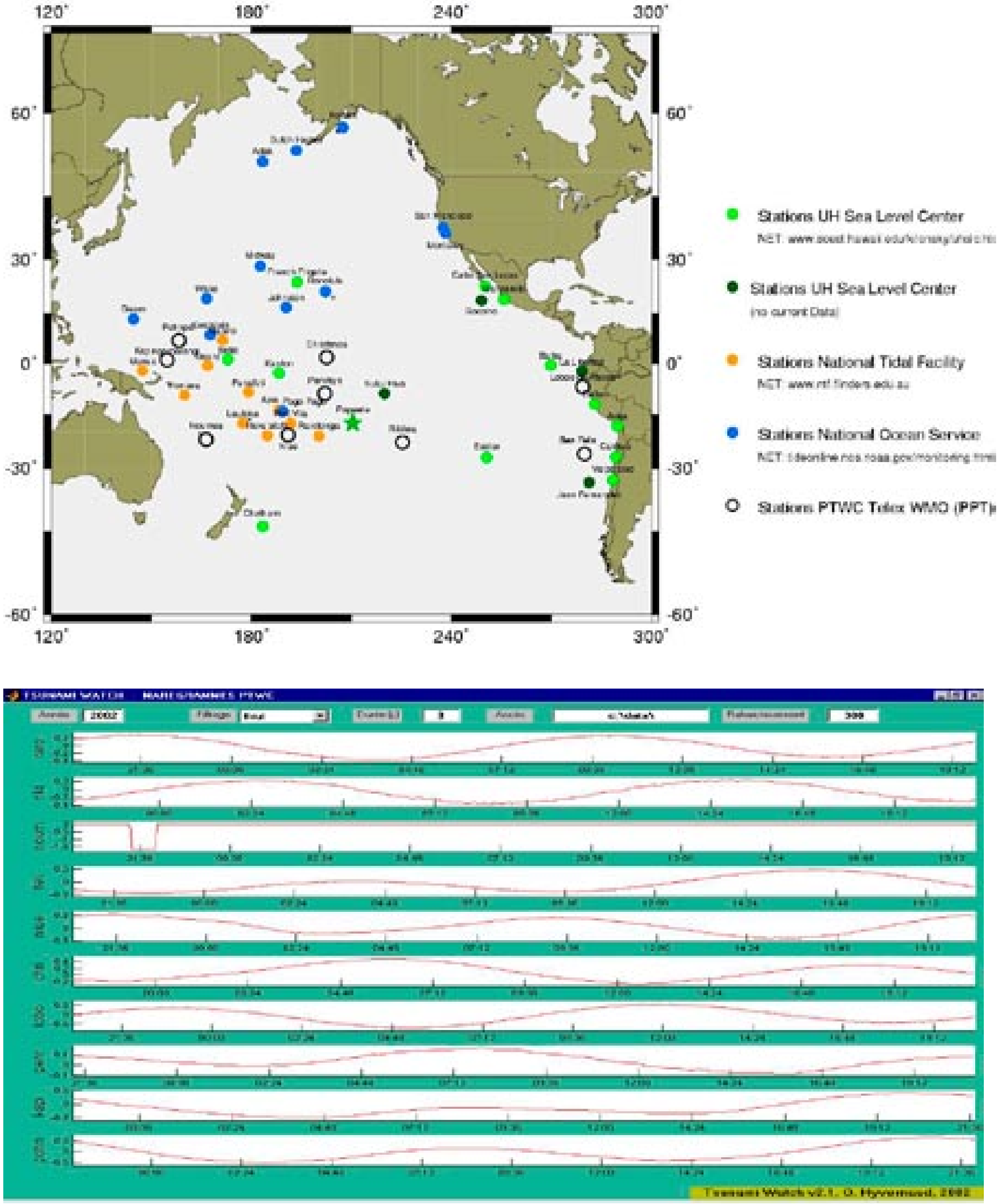


Figure 4. Top: Location of the tide gauges belonging to several institutes. Bottom: Real-time maregrams from PTWC station received by telex through the WMO (World Meteorological Organization) network.

EVOLUTION OF THE TSUNAMI WARNING PLAN..., *continued*

The new tsunami emergency plan:

Significant advancements in technology and data analysis, along with a better understanding of tsunami generation physics, prompted Civil Defense to initiate an update and re-evaluation of the 15-year-old emergency plan this past year. In doing so, it was determined that a color-coded warning system would best facilitate the progress of actions during a real warning. The colors of warning would be a function of the time delay and seriousness of the danger, and be similar to the color codes used by Meteo-France for typhoon warnings. The seriousness of the danger would be a function of 2 parameters: the delays available (3, 6, 9 hours) and the event's magnitude, as established by the scalar seismic moment given by TREMORS system. Table 1 shows the color scale of warning as a function of the time delay (depending on the concerned regions) and magnitude. The time delays were simply set at 9 hours, 6 hours, and less than or equal to 3 hours, and the actions corresponding to each color were set to be:

YELLOW	Warning at the Laboratory. Warning for Civil Defense, High authorities, State Governors, and Territorial Government, but no action required immediately. Further evolution of the warning to depend on several parameters, including the earthquake's location, tide gauge readings, external information, and reports by PTWC or other warning centers. The warning can be cancelled at any time based on external information or other reports.	Delay > 9 hours and Mm > 7.0
ORANGE	Warning of Civil Defense, City and Local Authorities and Municipalities, Police Headquarters, and other emergency responders, but a severe danger of tsunami has not been confirmed. The time delay is 6-9 hours before the tsunami arrival, and the population has not been informed of a possible evacuation.	Delay > 6 hours and Mm > 8.0
RED	Imminent danger (less than 3 hours), or very severe danger of tsunami. General warning for evacuation of population along the coast, boats in harbors, and airport.	Delay < 3 hours and Mm > 8.0 ---------------------------- Delay > 9 hours and Mm >9.0

Table 1. Tsunami Warnings for French Polynesia

A 2-day tsunami exercise in Marquesas: Test of the new emergency plan

The Marquesas Islands are at high risk for impact from distant tsunamis, especially from tsunami originating in South America. For the earthquakes in Peru on Feb, 21, 1996 (magnitude. 7.3) and Chile in July, 1995 (Magnitude 8.1), the observed run-up was 3 to 4 meters on some islands of the Southern Marquesas even though run-ups were only a few tens of centimeters in the far field over the rest of Pacific (Figure 5). Post-event numerical simulations showed that this large tsunami amplification effect coming from Chile and Peru events was very well explained by focusing effects caused by the local bathymetry and configuration of the impacted bay [1]. Because of this heightened tsunami risk, the Marquesas Islands were chosen as a good location at which to conduct the new tsunami warning test exercise.

EVOLUTION OF THE TSUNAMI WARNING PLAN..., *continued*

Figure 5. Video images of the July 30, 1995, tsunami generated in Chile (Mo = $2.0x10^{21}$ N.m.) in Tahauku Bay (Hiva Hoa). Right: Arrival of the tsunami in the bay; the waves seen are not meteorological swells, but the tsunami itself! Left: A vortex caused by the pier and strong currents. The run-up was about 3-4 meters, and was observed during the February, 1996, Peruvian "slow" earthquake (Mo = $2x10^{20}$ N.m.).

To validate the new tsunami warning plan, a 2-day exercise was held at the initiative of the State Governor of the Marquesas on three islands: Hiva Hoa, Tahuata, and Fatu Hiva. For this exercise, the scenario of a magnitude 8.4 earthquake originating in Chile was chosen. The choice of the earthquake's location and magnitude was based on a realistic scenario in which only the Marquesas Islands would be placed in a tsunami warning (and not the whole of Polynesia). This exercise involved only municipalities, police, and state administrators, and not the general population, and the goal was to test and identify potential problems during the warning that might occur between the Civil Defense bureau and all local municipalities/authorities of South Marquesas.

The scenario for the exercise followed the chronology of the simulated event:

- T0: Seismic warning at the LDG Tahiti (Geophysical Laboratory of Tahiti)
- T0 + 20 minutes : ORANGE warning transmitted to Civil Defense
- T0+ 40 minutes: Confirmation of the magnitude by LDG Tahiti.
- T0 + 1hour: Estimation of the tsunami amplitude (via seismic moment); diffusion of RED warning to Civil Defense (who transmitted it to municipalities).
- T0 + 2 hours: Tsunami amplitude received from tide gauge of Arica; CONFIRMATION of a dangerous tsunami for the Marquesas Islands.

During the exercise, CPPT and Civil Defense transmitted one message per hour to local authorities, including messages which gave practical suggestions on emergency inventories and actions (telephone, radio, available cars, safe (and high) places for the population to evacuate to, infirmaries, and other essential facilities). To help identify any potential problems, the different municipalities were visited by a group of experts (composed with the State Governor of the Marquesas, and members of Civil Defense, LDG Tahiti, Army, and State Government). Small conferences were given to the population in the concerned municipalities to explain the tsunami phenomenon and its dangers. At the end of the exercise, a meeting involving all the participants was held to provide a summary and identify areas of concern and those needing improvement. The exercise was valuable, and it was thought that doing such an exercise every year can only improve reflexes and responses of the local authorities during real tsunami warning situations. This is especially pertinent because of the potential that a magnitude 9 earthquake in North Chile, currently seismic gap in this region, could one day occur that generates a tsunami that would devastate the Marquesas.

For more information on the French Polynesian Tsunami Warning System and the Marquesas tsunami exercise, please contact cppt@labogeo.pf.

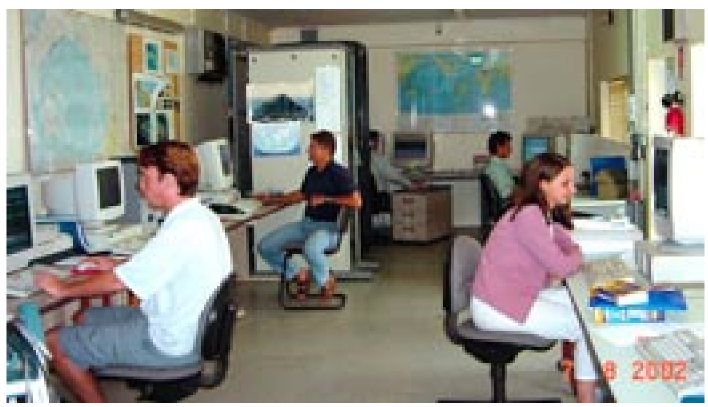
EVOLUTION OF THE TSUNAMI WARNING PLAN..., *continued*

References

[1] Guibourg S., Heinrich P., and R. Roche, 1997, Numerical modeling of the 1995 Chilean tsunami, impact on French Polynesia, Geophysical Research Letters, v. 24, no 7, p. 775-778.
[2] Newman, A.V. and E.A. Okal, 1998, Teleseismic estimates of radiated seismicenergy: The E/Mo discriminant for tsunami earthquakes, Journal of Geophysical Research v. 103, no. B11 p. 26885-23898.
[3] Okal, E.A. and J. Talandier, 1987, M_m: Theory of a variable-period mantle magnitude, Geophysical Research Letters, v. 14, no. 8, p. 836-839.
[4] Okal, E.A. and J. Talandier, 1989, M_m: A variable-period mantle magnitude, Journal of Geophysical Research v. 94, no. B4, p. 4169-4193.
[5] Reymond, D., Hyvernaud, O. and J. Talandier, 1991, Automatic detection, location and quantification of earthquakes: Application to tsunami warning, Pageoph, v. 135, p. 361-382.
[6] Reymond, D. and E.A. Okal, 2000, Preliminary determination of focal mechanisms from inversion of spectral amplitudes of mantle wave, Physics of the Earth and Planetary Interiors, v. 121, p. 249–271.
[7] Talandier, J. and E.A. Okal, 1989, An algorithm for automated tsunami warning in French Polynesia based on mantle magnitudes: Bulletin of the Seismological Society of America, v. 79 no. 4, p. 1177-1193.

CPPT Staff (right to left): D. Riquet, O. Hyvernaud, J.M. Chazette, T. Tchoung Yao, J. Orzea, and D. Reymond. Other staff not pictured include: S. Quema, M. Jissang, R. Motahi, along with the photographer, Wong Youne Kiane.

CPPT staff inside the warning system's operations room.



BASIC PACIFIC TSUNAMI CATALOG AND DATABASE, 47 BC – 2002 AD

submitted by Dr. Viacheslav K. Gusiakov, Tsunami Laboratory, Institute of Computational Mathematics and Mathematical Geophysics, Siberian Division, Russian Academy of Sciences, Novosibirsk, Russia

A comprehensive Historical Tsunami Database (HTDB) for the Pacific region has been compiled as part of the joint IUGG/Tsunami Commission and ICG/ITSU Project, "Basic Pacific Tsunami Catalog and Database". The project goal is to compile a digital parametric catalogue of historical tsunamis in the Pacific. The database consists of the two main parts: the catalog of tsunamigenic events with their basic source parameters and the catalog of the observed run-up heights provided with the exact geographical coordinates of the observational sites. The current version of the database (version 3.8, July 31, 2002) covers the period from 47 B.C. to the present, and contains data on 1297 historical tsunamigenic events and almost 7500 run-up heights. The set of collected parameters includes event date, time, source location, source depth, surface wave and moment magnitudes, Abe's tsunami magnitude [*Size of great earthquakes of 1957-1974 inferred from tsunami data, J. Geophys. Res., B84, 4, 1561-1568, 1979*], tsunami intensity on the Soloviev-Imamura scale [*Tsunamis: The assessment and mitigation of* (continuued on page 12)

CONFERENCES

September 10-15 (Tuesday-Sunday) Petropavlovsk-Kamchatskiy,Russia,

Local Tsunami Warning and Mitigation. International Workshop organized by the IUGG Tsunami Commission (IUGG/TC) and the International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) in commemoration of the 50th Anniversary of the 1952 Great Kamchatka Earthquake and Tsunami. Co-conveners are Dr. Joanne (Jody) Bourgeois (j.bourgeo@u.washington.edu) and Dr. Mikhail Nosov (psiwc47@phys.msu.su). The purpose of the workshop is to consider the local tsunami problem and to discuss fundamental and applied studies directed toward reduction of the local tsunami hazard. The result of the workshop will be recommendations on strategies for local tsunami warning and mitigation. Meeting schedule and abstracts can be found at the workshop's Website: http://oceanc47.phys.msu.su/.

September 24-26 (Tuesday-Thursday) Bali, Indonesia,

Regional Workshop on Best Practices in Disaster Mitigation. Organizied by the Asian Disaster Preparedness Center (ADPC) The first announcement reads: "With co-organizers [US Agency for International Development], this workshop aims to share seven years of knowledge, experiences and lessons learned on the Asian Urban Disaster Mitigation Program (AUDMP) and other disaster mitigation initiatives of the Asian Development Bank, the Earthquake and Megacitiies Initiatives, United Nations agencies (particularly the UN International Strategy for Disaster Reduction), the World Bank and many non-governmental organizations" Registration is online. For more information, e-mail audmp@ait.ac.th, or visit: http://www.adpc.ait.ac.th/audmp/rllw/default.html.

October 3-6 (Thursday-Sunday) Antalya, Turkey,

HAZARDS 2002 SYMPOSIUM Ninth International Symposium on Natural and Human-made Hazards *"Disaster Mitigation in the Perspective of the New Millennium"* Natural Hazards Society Organizing Committee is headed by Professor Dr. Nuray Karanci and Associate Professor Dr. Ahmet C Yalciner, Middle East Technical University, Turkey. HAZARDS 2002 will attempt to approach all hazards, with specific topics at this symposium including public education and preparedness, lessons from past disasters, teleseismic & local tsunamis (generation, propagation, modeling), the IDNDR/ISDR, NGO/NPO, and volunteer contributions. To learn more about the conference, see http://www.hazards2002.metu.edu.tr//.

October 6-20 (Sunday-Sunday) Beijing, China,

The 1st International Training Course on Earthquake Disasters and Disaster Mitigation for Developing Countries. Sponsors: Ministry of Science and Technology (MOST), Commission on Earthquake Hazard, Risk and Strong Ground Motion (SHR), IASPEI, Asian Seismological Committee(ASC), and Seismological Society of China (SSC). The course consists of lectures, practice and visits, discussion and summary. Participants will present papers to the training session, and a seminar will address developing national seismic observation systems and experiences in seismic hazard mitigation. For more information, contact: Su, Xiao-Lan, 5 Minzudaxuenan Road, IGCSB, Beijing 100081, China; Tel: +86-10-6846-7978; Fax: +86-10-6841-5372; E-mail: suxl@eq-igp.ac.cn; Web site: http://www.icce.ac.cn/most/workshop.htm.

October 10-11 (Thursday-Friday), New Delhi, India,

Seminar on Women and Disaster Management. Sponsored by the Indian Environmental Society (IES) this two day seminar on the occasion of World Disaster Day is being held in order to understand and improve the socio-economic condition of women after and before the natural disaster and also to highlight the role of women in disaster management. Contact: Indian Environmental Society U-112, Vidhata House, 3rd Floor, Shakar Pur, Vikas Marg Dehli--110092; Tel: (911)2046823; Fax: (911) 2223311; E-mail: iesenro@del2.vsnl.net.in; Web site: http://www.iesglobal.org.

October 15-18 (Tuesday-Friday), Shanghai, China,

5th International LACDE Conference. The Shanghai Municipal Civil Defense Office and the Mayor of Shanghai will be hosting the next international LACDE (Local Authorities Confronting Disasters and Emergenices) conference. The conference will focus on systems to reduce city disasters, regulation and preparation, disaster communications, building safety, disaster (fire,

CONFERENCES, *continued*

earthquake, storm etc.) management and emergency rescue technology and equipment. For further information contact the International Secretariat (lacde@mfb.sh.cn) or the Conference Organizing Committee, Room 2109, 593 Middle Fuxing Road, Shanghai 200020, China; Tel: +86-21-24028182; Fax: +86-21-647-24028456; Website; http://www.mfb.sh.cn.

May 5-7 2003 (Monday-Wednesday), Fiji (Outrigger Reef)

Public Safety and Risk Management Conference. Sponsored by SOPAC (South Pacific Applied Geoscience Commission). The purpose of the conference is the promotion of disaster reduction policy/legislation development, research, training, scientific knowledge and technology transfer towards the reduction of community vulnerability from natural, environmental, technological and human induced disasters.
For more information visit http://www.sopac.org.fj/Secretariat/Units/Dmu/Conference.html or contact: Vive Vuruyak;vive@sopac.org or Tel: 679 338 1377.

BASIC PACIFIC TSUNAMI CATALOG AND DATABASE, *continued*

of earthquake risk, Natural Hazard, 1, UNESCO, Paris, 118-139, 1978], maximum tsunami run-up height, number of available run-up observations, cause of the tsunami, validity of the event, coded name of the source region, warning status (for the events after 1960) and the main reference to the event. The basic set of quantitative parameters collected by the HTDB/PAC Project (event and run-up catalogs) is available at the following Web site URL: http://tsun.sscc.ru/htdbpac. The full version of the database includes textual descriptions of tsunami manifestation (about 240 events), and reference information related to the tsunami problem in the Pacific. This CD-ROM distribution also contains a GIS-type graphic shell for easy data retrieval, visualization, and processing. The graphic shell runs under Windows 95, 89, 2000, NT 4.0 and XP. The CD-ROM can be ordered from the Tsunami Laboratory, ICMMG/SDRAS, Pr.Lavrentieva, 6, Novosibirsk, 630090, Russia, Fax: +7(3832)34-37-83; Email: gvk@omzg.sscc.ru.

Located in Honolulu, the International Tsunami Information Center (ITIC) was established on November 12, 1965 by the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO). In 1968, IOC formed an International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU).

The present 25 Member States are:
Australia, Canada, Chile, China, Colombia, Cook Islands, Costa Rica, Democratic People's Republic of Korea, Ecuador, Fiji, France, Guatemala, Indonesia, Japan, Mexico, New Zealand, Nicaragua, Peru, Philippines, Republic of Korea, Samoa, Singapore, Thailand, the Russian Federation and the United States of America.

http://www.shoa.cl/oceano/itic/frontpage.html
(Chile Site)
http://www.prh.noaa.gov/itic/
(USA Site)

International Tsunami Information Center
737 Bishop Street, Suite 2200
Honolulu, Hawaii 96813 USA
Phone: (808) 532-6422/6423
Fax: (808) 532-5576
E-mail: itic.tsunami@noaa.gov