TsuInfo Alert

prepared by the Washington State Department of Natural Resources on behalf of the

National Tsunami Hazard Mitigation Program

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Contents

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TsunamiReady communities—No overnight solution

By George Crawford, Washington Emergency Management Division

December 26, 2004, Sumatra earthquake and tsunami served as a grim reminder to those of us in the Pacific Northwest that we will have to deal with a similar event originating from the Cascadia Subduction Zone in the future. The Pacific Rim states of Alaska, California, Hawaii, Oregon, and Washington have been preparing for both local and distant tsunami events since before the inception of the National Tsunami Hazard Mitigation Program (NTHMP) in 1997. This program created a consortium of federal and state partners that lend both scientific and emergency management expertise to develop products such as hazard assessments, inundation and evacuation maps, and warning systems for communities at-risk from tsunamis.

In 2001, the National Weather Service (NWS) began its TsunamiReady program to provide coastal communities with guidelines for hazard awareness, improved planning, and public education to help them survive in the event of a tsunami strike. A community that meets program criteria may be recognized as TsunamiReady by the NWS. However, the TsunamiReady program only lays a foundation upon which a vulnerable coastal community can build its tsunami awareness and preparedness infrastructure. Washington and other NTHMP states have also applied emergency management principles and scientific product development initiatives that encourage communities to take steps toward becoming "tsunami resilient." This continuous process of mitigation and preparedness includes the following:

Hazard identification and risk assessment is the first step in the development of an understanding of a community's vulnerability and serves as the foundation for public education. Scientists can develop a tsunami model and inundation map that provides information such as wave heights, inundation zones, water depths, and land deformation. By identifying the hazard, assessing the risk, and understanding the associated issues, local decision makers can develop preparedness and response plans based on actual risk and vulnerability. They can define and establish evacuation routes and install signs, designate assembly areas, and develop strategies to care for evacuees. The model and map can also be used for land use planning and for developing ordinances to protect the community's infrastructure and economic base. To be eligible for federal hazard mitigation grant funding, all these activities should be incorporated into a local hazard mitigation plan that is compliant with the Disaster Mitigation Act of 2000.

A good public education program directly addresses tsunami hazard issues and presents information about mitigation and preparedness simply and clearly. Such a program should use risk communication principles and tools to change public perception of the threat and to generate community buy-in for tsunami preparedness actions that will reduce vulnerability and loss of life and protect a community's infrastructure and economic base. It will also improve the community's ability to react correctly to evacuation orders and procedures and decrease the likelihood that individuals will take legal action against their local government after a disaster.

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(continued from page 1)
Good risk communication tools for tsunamis include the following:

Tsunami warning and evacuation signs identify tsunami risk areas and evacuation routes and generate significant media attention locally and nationally. They educate communities at a broader level than any other mitigation tool, bring long-term mitigation issues to the table for discussion, and provide a cost effective way of disseminating a consistent message. In addition, tourists get the same message regardless of which tsunami-vulnerable state they are visiting.

Tsunami brochures with evacuation maps provide information about tsunamis, warnings, evacuation procedures, 72-hour emergency survival kits, local NOAA (National Oceanic and Atmospheric Administration) Weather Radio (NWR) frequencies, and more. These brochures are placed throughout coastal communities in locations that people are most likely to frequent: visitor centers, hotels and motels, ferry terminals, medical offices, libraries, local businesses, and community centers.

To validate an education program's goals and objectives, a tsunami-resilient community must use social science tools, such as surveys and focus groups. These tools help quantify public understanding of the tsunami hazard and warning and evacuation procedures and the degree to which individuals are prepared to deal with hazard consequences. The community can use this information to develop strategies that will guide preparation of future public education initiatives and materials. For example, small business focus groups could assess the hospitality industry's preparedness efforts, which should include continuity planning, staff and customer awareness, and the capability to receive alert and notification messages as well as to evacuate guests out of the tsunami hazard zone. Lessons learned from the Sumatra event clearly indicate that the tourism industry should be an integral part of a community's preparedness and education program as well as its alert, notification, and evacuation processes.

Integrated on-shore communications must be in place to get the warning message to the public. The NTHMP works to ensure tsunami warning information is as accurate as possible. It uses real-time data provided by two systems: deep ocean detection tsunameters and an NTHMP seismic network. Real-time data provides the West Coast/Alaska and Pacific Tsunami Warning Centers with quick and reliable information to determine whether a seismic event has generated a tsunami in the Pacific Ocean. Having these two 24-hour warning points and an integrated on-shore communications infrastructure that supports alert and notification ensures effective and rapid notification to citizens and tourists in at-risk communities.

In Washington State, NWR supplements coastal communities' communication infrastructures and improves local access to emergency information. NWR receivers are installed at designated Emergency Information Centers, including visitor centers, hotels and motels, marinas, ports, gas stations, and grocery stores. NWR placards are visibly posted at sites with weather radio receivers.

The NWR is an effective and rapid alert and notification system than can warn listeners about a hazard before the mass media and the state or county alerting systems can do so. This gives people additional time to react before danger hits their area. Washington has designated September as NOAA Weather Radio Awareness Month. The goal is to have NWR receivers as common as smoke detectors in homes and businesses statewide to help protect lives and property from natural and technological hazards.

While these receivers are gaining popularity in coastal areas, most communities lack a notification system for remote beachheads and heavily trafficked areas. In the areas hit by the recent tsunami, lack of warning to the people on the beaches and in other highly vulnerable areas resulted in loss of life that otherwise could have been avoided.

In July 2003, to remedy the lack of such a warning system, Washington State deployed an All Hazard Alert Broadcasting (AHAB) radio system to provide all-hazard warnings to heavily trafficked tourist areas in Ocean Shores, Washington, one of the state's most at-risk tsunami communities. This system ties into the Emergency Alert System and the National Weather Wire Service, giving it the same capabilities as the NWR. AHAB is economical, reliable, voice and siren capable, and can use wind power, solar panels, or commercial electricity to charge its batteries. National authorities as well as state and local officials can trigger the system, which can also be used as a public address system by local emergency response vehicles with the correct communication protocols.

Regardless of the communication alert and notification systems used by an at-risk tsunami community, it must ensure that all affected individuals receive warning messages in a rapid

and efficient manner to avoid the potential loss of life from a tsunami.

A community does not become tsunami resilient overnight. The NWS TsunamiReady program provides the foundation as well as recognition to those that have embraced the TsunamiReady process. This recognition can be achieved only as a community's culture is changed, its citizens become sensitive to the tsunami hazard, and they prepare for it. The community must develop a strong public education program with an emphasis on risk communication tools supported by hazard identification and risk assessment, preparedness and mitigation planning, public education tools, on-shore communications, training, and exercises. The NTHMP facilitates the development of such a program and is the key to the development of tsunami-resilient communities.

Internet Resources
http://www.stormready.noaa.gov/tsunamiready/
TsunamiReady Program
http://www.pmel.noaa.gov/tsunami-hazard/
National Tsunami Hazard Mitigation Program
http://emd.wa.gov/5-prep/PnP/prgms/eq-tsunami/tsunami-idx.htm
Washington Coast Tsunami Preparedness Information
http://www.nws.noaa.gov/nwr/
NOAA Weather Radio

from: Natural Hazards Observer, v. 29, no. 6, July 2005, p. 5-6.
http://www.colorado.edu/hazards/o/july05/july05c.html♦

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Warning and Informing the Public
Kenneth Allen, Partnership for Public Warning (formerly)
From: *Natural Hazards Observer*, v. 29, no. 6, July 2005, p. 11-12.
http://www.colorado.edu/hazards/o/july05/july05e.html

Since September 11, 2001, an unprecedented amount of attention and resources have been invested in homeland security and emergency management. Every level of government—federal, state, local, and tribal—is focused on protecting, detecting, and responding to emergencies, natural and otherwise. While these efforts are vital, most emergency managers recognize that government is only part of the solution. Individuals must make informed decisions and take appropriate actions to protect themselves and their families. To know what to do and when during an emergency, the public depends on receiving timely, accurate, and useful information from the government. Unfortunately, recent events (e.g., the May 11, 2005, evacuation of the White House and Capital) have demonstrated that this is an area where much can be improved.

State and local emergency managers have long known that effective warnings save lives, reduce property losses, and speed economic recovery. They have also known that the nation's existing public warning systems are fragmented, rely primarily upon radio and television, are not interoperable, and often provide contradictory or inconsistent information. Existing systems often fail to provide information that can be understood by those citizens with special needs (such as the 40 million Americans who are hearing impaired) and those who do not speak English. The bottom line is that these systems fail to reach many individuals who are at risk while unnecessarily warning many who are not. This article tells the story of a grass-roots initiative that sought to focus attention on the issue of public warning.

In early 2001, emergency managers from state and local government, after discussions with representatives from industry, academia, and the nonprofit community, decided to hold a public warning summit in Washington, DC, in December 2001. On September 11 of that year, the world changed. And, when over 130 individuals from government and the private sector came to Washington for the December summit, the fact that not a single public warning system had been activated on September 11 was undeniably top of mind.

Summit participants agreed that improving America's public warning capability should be made a national priority. They also agreed that achieving this objective would require cooperation and collaboration among a wide variety of stakeholders, both public and private. To foster this collaboration, attendees decided to launch an objective, consensus-based forum where government, industry, and other interested stakeholders could work together. A few weeks later the Partnership for Public Warning (PPW) was created as a public-private partnership.

The PPW's first initiative was to assist the federal government in the development of a terrorist threat system. This was followed by a comprehensive assessment of the Emergency Alert System, which set the stage for the PPW's

development of a national strategy and implementation plan for improving the nation's public warning capabilities; further work on the Homeland Security Advisory System; and the development of a standard for communicating public warning messages across different technology platforms.

By 2004, the partnership was having funding difficulties. The majority of the PPW's funding had been privately raised and consisted of dues, grants, and contributions, but the organization was in dire need of federal funding. Congress had appropriated $10 million to the U.S. Department of Homeland Security for public warning and there was hope that a portion of this funding would be used to support the PPW. Despite it's recognition as the only national organization addressing the issue of public warning and numerous conversations with senior government officials, no funding made its way into PPW coffers. Ultimately, in April 2005, the Partnership for Public Warning was officially dissolved (see the *Natural Hazards Observer*, May 2005, p. 7). During its short life, the PPW had a number of significant accomplishments. Significantly, the PPW:

- Conducted the first comprehensive review of the Emergency Alert System and provided recommendations on how to make it more effective.
- Provided recommendations on how to improve the Homeland Security Advisory System (the color-coded terrorist alert system).
- Provided the leadership that led to the first interoperability standard for alert and warning, the Common Alerting Protocol (CAP), which was adopted as a national standard by the OASIS XML standards group.
- Led the public warning community to the recognition that better public warning is not a technology problem and that the major problems with the nation's existing public alert and warning capability include inconsistent warning systems, lack of clear and consistent messages, lack of clear policies and procedures, failure to implement and maintain warning systems, and lack of public education.
- Developed a national strategy for addressing the above problems and improving America's public warning capabilities that recommends the following:
  - Develop one integrated all-hazards warning capability;
  - Develop standard terminologies and threat scales;
  - Develop clear guidance on what constitutes an effective warning message;
  - Develop clear policies and procedures regarding the dissemination of warning messages;
  - Promote interoperability standards to permit the dissemination of warnings across multiple platforms;
  - Develop policies and procedures for regularly testing community warning systems;
  - Educate the public as to how they will be warned, what the warnings mean, and how to react; and
  - Provide a collaborative, consensus-based forum where government, industry and other interested stakeholders can work together.

While many communities would benefit from an investment in new systems, these activities do not require major new financial investments or a significant amount of time. The PPW developed an implementation plan for the national strategy that could be completed in a mere 24 months and for less than $10 million.

- Developed criteria that emergency managers, public officials, and citizens can use as benchmarks in assessing public warning systems. While not every system will fulfill all the criteria, the same criteria are applicable to systems at the local, state, and federal levels. Features of an effective warning system include:
  - Supports multiple types of hazards;
  - Does not put message provider or recipient at risk;
  - Is always on and always ready to warn;
  - Is reliable, redundant, and secure;
  - Can reach and address everyone (including individuals with special needs, non-English speakers, and transient populations) in affected locations or areas;

- Supports multiple distribution channels employing multiple technologies (e.g., telephones, cell phones, personal digital assistants, personal computers, televisions, radios, and other consumer electronics); and
- Employs clear, uniform alert and warning terminology.

- Developed a public warning primer for public officials, which includes the above criteria and issues such as the "cry wolf" and "too much information" myths and provides guidance on developing effective public warnings. The most effective public warning messages employ:
  - Easily understandable "trigger words";
  - Words that the majority of the population find simple and memorable;
  - Words that are transferable across hazards;
  - Words that easily translate into other languages; and
  - Words that can be used across media, such as a 10-character pager, a 12-character cell phone, or a 60-character short messaging appliance.

While there is still much to do, the partnership's efforts have had an impact. CAP is gaining widespread acceptance among state and local emergency managers. And, as communities and states begin discussions about implementing new public warning capabilities, many of the PPW's recommendations regarding effective systems and messages are front and center.

The Federal Communications Commission (FCC) recently undertook a major initiative seeking public comments on steps that should be taken to improve the nation's public warning system. The FCC stated that this inquiry was based partly upon the work done by the PPW. While it is unclear as to what will happen as a result of this inquiry, it is encouraging that at least one federal agency is seeking input from the public and other concerned stakeholders.

The PPW's work has also had an impact around the world. The United Kingdom has a partnership on public warning similar to the PPW called the National Steering Committee on Warning and Informing the Public, which has followed the PPW's activities closely. Additionally, recent proposals coming out of Southeast Asia to develop a public warning system to protect citizens from future tsunamis have drawn heavily upon the PPW's work.

So why did the partnership not succeed? The most important reason is the lack of public outcry regarding the need to develop a more effective public warning capability. Most citizens and government leaders, having grown up listening to the "this is a test of the emergency alert system" messages on radio and television, believe that an effective public warning system already exists. A second reason is that public warning encompasses all levels of government and requires close cooperation between government and industry. There must be leadership to bring these stakeholders together. The most likely candidate is the federal government. Unfortunately, no single federal agency has the statutory authority or resources to provide this leadership role. A number of federal agencies, including the U.S. Department of Commerce and the FCC, participated in the PPW. However, they lacked the authority to assume a leadership role in this area. The creation of the U.S. Department of Homeland Security offers some hope that a federal leader in public warning may emerge. But, the process of establishing the department has diverted management attention from issues such as public warning.

The Partnership for Public Warning is no more. However, there is still much that can be done to improve America's public warning capability. The next steps are up to you.

The Partnership for Public Warning's Web site, which contains many of the projects mentioned herein and links to other valuable resources, is being maintained as a public service by The MITRE Corporation at http://www.partnershipforpublicwarning.org/.

PPW documents include *The Emergency Alert System (EAS): An Assessment* (February 2004)**,** *A National Strategy for Integrated Public Warning Policy and Capability* (May 2003), *Public Alert and Warning—-A National Duty, A National Challenge: Implementing the Vision* (September 2003), and *Developing A Unified All Hazards Public Warning System* (November 2002). ♦

[Ed. Note: see also box on page 26]

A Disaster, by Any Other Name…

By Juan Murria, Consulting Engineer, Advisor to the President of the Venezuelan Foundation for Seismological Research

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Traduttore traditore (Translator, traitor) *Italian proverb*

My interest in words and their meanings, as well as the problems I have confronted with translation and interpretation in several languages in the fields of both engineering and disaster management for more than fifty years, have prompted me to research the etymology of the word disaster and its translation in languages other than English as well as its linguistic, etymological, cultural and social connotations. This paper does not pretend to be a learned treatise on the subject, nor does it concern itself with the sociological or disaster research and management definitions of disaster. In this paper I will only attempt to reflect my interest in words and the potential pitfalls of the translation processes.

Introduction

I have been involved for more than fifty years of professional activity in the problems of translation and interpretation, mainly in Spanish and English, but also in French, Italian, Dutch, and Portuguese. This—together with my constant interest in words, their origin and their meaning—led me to carry out some research on the origin and the meaning of the word *disaster* and how it translates in languages other than English.

I will not forget the well known Italian proverb *Traduttore, traditore* (Translator, traitor). This proverb has been my guide throughout all these years of internationalization or, to use the more up-to-date term, globalization of my professional activities. For whatever it is worth, my experience throughout all these years of international activities has only confirmed how much truth there is in this Italian proverb.

In the fall of 2002 I spent two months at the Disaster Research Center (DRC) in the University of Delaware in Newark where I had the privilege of having mnay enlightening conversations with Professor E. L. (Henry) Quarantelli. In the course of one of those conversations, the topic of translations in the field of disaster research and management came up and a very interesting exchange of experiences and anecdotes took place (Quarantelli, 2000) that, in a way, encouraged me to continue the research on the etymology of the term *disaster* and its translation in different languages.

A word of warning: This paper is not a learned treatise on the etymological definition, or of the sociological or scientific interpretation of the term *disaster*. I would leave that for the specialists (Quarantelli, 1995; Porfiriev, 1995). This paper is only an initial attempt for a non-specialist—a civil engineer by training and a "disasterologist" by vocation—interested both in disasters and in words and their meaning.

Defining the term "definition"

Before going into an English dictionary (Webster's 1975) to get the many and varied definitions of the noun *disaster*, let us define the noun *definition*:

Def·i·ni·tion (def' e-nish en) *noun*
Abbr. def.
1. a. A statement conveying fundamental character. b. A statement of the meaning of a word, phrase, or term, as in a dictionary entry.
2. The act or process of stating a precise meaning or significance; formulation of a meaning.
3. a. The act of making clear and distinct; a definition's of one's intentions. b. The state of being closely outlined or determined; "With the drizzle, the trees in the little clearing has lost definition"
(Anthony Hyde). c. A determination of outline, extent, or limits: the definition of a President's authority.
4. a. The clarity of detail in an optically produced image, such as a photograph, effected by a combination of resolution and contrast. b. The degree of clarity with which a televised image or broadcast signal is received.
[Middle English *diffinicioun*, from Old French *definition*, from Latin dêfinìtio-, dêfinìtion-, from dêfinìtus, past participle of dêfinìre, to define.]

The origin and meaning of the word *Disaster*

A first look into dictionaries in Spanish, English, French, Italian, Portuguese—and even Catalan and Malay—gave similar and consistent answers.

The noun *disaster* comes to us from the Latin via the Italian and is related to star, celes-

tial body, in a negative sense (the Latin prefix *dis* meaning negation, apart, the opposite, and the name *astro* meaning *star* from the latin *astrum*.) It would, then, seem logical to dwell for a while on the synonyms of *disaster* in the Latin language and try to obtain from there some etymological insight.

The procedure followed has been to consult dictionaries Latin-English and Latin-Spanish, obtain the several synonyms of the noun *disaster* and then look at each one of those synonyms and obtain their English equivalents.

The following synonyms were found for the noun *disaster* in Latin:

clades, cladis = material damage or loss, calamity, accident, harm, disaster, destruction, unfortunate accident, disgrace.

incommodum, incommodii = inconvenience, lack of comfort, discomfort, nuisance, vexation, anger, uncomfortableness.

calamitas, calamitatis = calamity, disgrace, disaster, loss, ruin, all kinds of damage and perjuicio or harm, harm, scourge, plague.

offensio, ofensi = offense, transgression, crime.

exitium, exitii = ruin, loss, destruction, fall, plague.

infortunium, infortunii = misfortune, mishap, ill luck, misery.

aerumna, aerumnae = prostration, fatigue, pain, calamity, adversity, misery, moral suffering.

ruina, ruinae = ruin, decline, downfall, overthrow.

Definitions of the noun *disaster* in the English language

Several sources were consulted with the following results:

Webster's (1975) gives the following etymology and definition of the noun *disaster*: di-sas-ter. *n*. [MF & OIt; MF *desastre*, fr. OIt *disastro*, fr. d*is* (fr. L) + *astro* star, fr. L. *astrum* – more al ASTRAL] 1 obs: an unfavorable aspect of a planet or star. 2: a sudden calamitous event bringing great damage, loss, or destruction; *broadly*: a sudden or great misfortune. Syn: DISASTER, CALAMITY, CATASTROPHE, CATACLYSM. Shared *meaning element*: an event or situation that is regarded as a terrible misfortune.

Microsoft's Bookshelf 98 (1998) defines the noun disaster as follows: dis-as-ter (dî-zàs-ter, -sàs) *noun*. 1. a. An occurrence causing widespread destruction and distress; a catastrophe. b. A grave misfortune. 2. *Informal*. A total failure: *The dinner party was a disaster*. 3. *Obsolete*. An evil influence of a star or planet. [French *désastre,* from Italian *disastro*: *dis*-, pejorative pref. (from Latin *dis*-). See dis-+ *astro*, star (from Latin *astrum*, from Greek *astron*).] Synonyms: *disaster, calamity, catastrophe, cataclysm*. These nouns refer to an event having fatal or ruinous results. *Disaster* generally implies great destruction, hardship, or loss of life: "A nuclear disaster, spread by winds and waters and fear, could well engulf the great and the small, the rich and the poor, the committed and the uncommitted alike" (John F. Kennedy). *Calamity* emphasizes distress, grief, or the sense of loss: "the heaviest calamity in English history, the breach with America" (James George Frazer).
Catastrophe especially stresses the sense of a tragic final outcome: "The unleashed power of the atom has changes everything save our modes of thinking, and we thus drift toward unparalleled catastrophes" (Albert Einstein). A *cataclysm* is a violent upheaval that brings about a fundamental change: old aristocratic institutions destroyed by the revolutionary cataclysm.

As can be seen in Webster's first definition the word *disaster* has a connotation of the supernatural (astral, fatality, religious, magical) which obviously reflected the early beliefs that people held and which, in many societies, still persists today.

This magical-religious connotation also appears in the old pre-Spanish civilizations—Incas, Mayas, and Aztecs—in the form of the names of some of their gods such as *Runa Camac*, he who "could bring in rains' or he who "by just moving around could generate tremors and earthquakes;" *Tolgon*, "the son of the mud that trembles" or *Gagavitz* known as "volcano or mountain of fire" (Garcia Acosta, 1996). Curiously enough, these pre-Spanish deities were associated with Catholic saints (St. Bartholomew with *Tunupa*; *Illapa* with St. Jacques).

This is what Musset (1996) calls "the supernatural dimension of the Christian vision" that identifies miracles, warnings, divine signals to avoid or mitigate the effect of disasters. This has been a constant among American peoples before, during and after the Spanish Colonization.

Still, my doubts remained as to how the term *disaster* would translate into other non-European languages such as Japanese, Chinese, Arabic, Malay, Korean, Hindi, Thai, Vietnamese, Russian and other Slavic languages, Basque, Gaelic, and so on. I then asked myself these questions: would I find the same origins and

meanings of the noun *disaster* as I did in English? Would it retain the supernatural connotation described above?

On and off for the better part of two years I have been looking up as many dictionaries as were available in several languages, and, also, taking advantage of the privilege of having many friends and colleagues all over the world, both in the areas of disaster management and of engineering. I began to request their cooperation in my search. The results are presented below.

The word *Disaster*

As mentioned above, dictionaries in Romance languages gave, virtually, the same answer: *Desastre* in Spanish; *desastre* in French; *disastro* in Italian; *desastre* in Portuguese; all having the same origin and meaning as could be expected in languages belonging to the Romance family (see below). But, what about other languages, either not belonging to the Romance family or not so widely spoken? Further research indicated that generally the word *disaster* translates in other languages as a synonym of the following English synonyms: disaster; catastrophe; revolution; calamity; debacle; mishap; denouement; mischance; misfortune; misadventure; reverse; and cataclysm.

Some useful definitions

Webster's (1975) gives the following definition of some synonyms of the noun *disaster:*

Ca-tas-tro-phe n. [Gk *katastrophe*, fr *katastrephein* to overturn, fr *kata-* + *strephein* to turn – more at STROPHE].

Ca-lam-I-ty n. pl –ties [MF *calamite*, fr L *calamitat-calamitas*; akin to L *clades-* destruction – more at HALT]. 1: a state of deep distares or misery caused by major misfortune or loss. 2: an extraordinarily grave event marked by great loss and lasting distress and affliction. *Syn* DISASTER.

Cat-a-clysm n. [F *cataclysme*, fr L *cataclysmos*, fr GK *kalaklysmos*, fr *kataklyzein* to inundate, fr *kata* + *kleizen* to wash – more at CLYSTER]. 1: FLOOD, DELUGE. 2: a violent geologic change of the earth's surface. 3: a momentous and violent event marked by overwhelming upheaval on demolition. Syn DISASTER.

As will be seen, other languages also prone to borrow words from Latin and Greek (German, Russian, Polish, Czech) give similar results. This will confirm that, for one reason or another, non-Romance languages do not retain the *disaster* root with its supernatural-astral-magic connotation.

The word "*Disaster*" in other languages

There follows a representative but very incomplete list of how the word disaster translates into several languages. The list has been organized by language families depending on their commonality of origin (Encyclopedia Britannica, 1966). In addition, when available, synonyms in English, as well as other meanings of the foreign words are also included *in italics* in parenthesis.

GERMANIC
Swedish = stor olycka (*Big accident*), katastrof.
Norwegian = Nod, ulykke c. uhell n. ulykkelig (*Calamitous, disastrous*).
Danish = Ulikke, katastrofe.
Dutch = the best translation—perfect translation—in Dutch is "ramp" = a sudden great misfortune. They talk about the 1953 flood in The Netherlands as the "stormramp", about "rampheheersing" = disaster management, and about a "rampenplan" = contingency plan. Near equivalents are "onheil", but this is slightly lighter, and "catastrofe", which is still somewhat stronger: i.e. a very big disaster (Velsink, 2003).
German = "das Unheil," "die Katastrophe".

ROMANCE
Spanish = Desastre
Italian = Disastro
French = Desastre
Portuguese = Desastre
Catalán = Desastre
Valenciano = Desastre

CELTIC
Irish = Tubaiste (*Calamity*)

HELLENIC
Greek = Katastrofe, olesrios
Albanian (modern version of former Thracian) = Fatkegesi (*Misfortune, calamity*)

LATIN
Latin = Disastro (See the Latin synonyms in the section "The origin and meaning of the word *Disaster*" above).

SLAVONIC
Servo-Croatian = Nesreca (*Bad luck, accident*), katastrofa
Slovac = Nestastic (*Misfortune, unhappiness, accident*)

Polish = nieszczescie (*Misfortune, adversity, bad luck*)
Polish = klesa (*Defeat, calamity, repulse*)
Polish = katastrofa (*Catastrophe, disaster, clash*)
Russian = beda (*Misfortune*) or bedstviye (*Disaster*) is an incident, accident or other harmful occasion resulting in losses and sorrow. Disaster is more related to cases of crop failure, epidemics, storms, floods. To suffer disaster means being in a disastrous or dangerous situation; badly needing something; dying. In *Tolkovi Slovar Zhivoao Veliokorusskogo Yazika*, by v. I. Dahl, as quoted by Porfiriev (1995).
Czech = tragedije (*Tragedy*)
Czech = nestesti, pohroma, katastrofa = catastrophe (Gross, 2003)

FINNO-UGRIC
Finnish = Onetto, muus, tuho
Hungarian = katasztrofa

SEMITIC
Arabic = Karitha, plural, Kaouarith (*Something bad happening with great loss of life and physical damage*)
Hebrew = Ason (*Disaster, accident*)

TURKIC
Turkish = Afet (*Something terrible happening but has another meaning which is "a very attractive woman*" (Karanci, 2003))
Turkish = Felaket (*Disaster, calamity, catastrophe. Slang: awful, terrific, yikim, demolishing, wrecking, destroying, destruction, ruin*)
Turkish = Bela (*Calamity, misfortune, evil, trouble*)
Turkish = Yikim (*Demolition, destruction, ruin*)

SINO-TIBETAN
Chinese = Zainan (*Calamity, suffering*)
Chinese = zaihuo
Chinese = ziran zaihai (*Natural disaster*)
Vietnamese = Tai bien (*Troublesome event, mishap*)
Vietnamese = tai hoa (*Accident*)
Vietnamese = tai hai (*Misfortune*)
Vietnamese = tai nan (*Accident*)
Vietnamese = tai hurong (*Disaster*)

AFRICAN
Burkina Faso (formerly Upper Volta) dialects
Moore = Yelbedo (*Bad news*)
Dagara = Yio (Something that happens to you suddenly causing damage and loss)
Dagara = Sabaado (*Something dreadful that you should run away from*)

DRAVIDIAN
Hindi = Yipda (*Calamity*)

URAL-ALTAIC
Korean = Chae-nan (*Misfortune, calamity, disaster)*
Korean = pul-haeng (*Something to do with fire*)
Japanese = Saigai (*Calamity, disastrous, involving great loss, accident*)
Japanese = Fuko, sainan (*Calamity*)
Japanese = Kozui (*Flood, inundation*)
Japanese = aihendo (*Cataclysm*)
Japanese = Geki no daidan'en, dai-saigai (*Catastrophe*)

In addition, my friend and colleague, Professor Susumu Yasuda, Tokyo Denki University, Saitama, Japan (Yasuda, 2003) sent me the following information from which I have extracts the appropriate terms in the listing below:
Saigai = natural disaster, disaster
Gekijin = heavy disaster
Senritu = shudder
Tempenchii = extraordinary natural occurrence
Muzan = cruel
Mijime = miserable
Hisan = misery
Waruihirase = bad news
Jishin = earthquake
Daijishin = big earthquake
Shougeki = shock
Shinsai = disaster due to earthquake
Zenkai = collapse of structures
Hankai = semi-collapse of structures
Gouu = heavy rain
Doshakuzure = slope failure with water
Kouzui = flood
Kasai = fire
Yakenihara = fired area
Kaminari = thunder

MALAYAN
Bahassa Melayu = Celaka (*The same as accident*)
Bahassa Indonesia = Ditto. The Indonesian and Malay languages are not very rich or strong in gradations.
Tagalog = Sakuna

POLYNESIAN
Hawaiian = Popilikia (*Misfortune, trouble, calamity, ordeal*)

Synonyms of the term *Disaster*

It would be interesting to look into the synonyms of the word disaster not only in English but in other languages as well. As the nouns catastrophe and cataclysm showed up consistently as one of its synonyms I have also looked them up and put them together in the following lists:

English: Disaster, catastrophe, revolution, calamity, debacle, mishap, denouement, mischance, misfortune, misadventure, reverse, and cataclysm (Webster's, 1953, 1975)

Spanish: Desastre, catastrofe, calamidad, devastación, asolamiento, ruina, cataclismo (Lexis 22, 1976)

Portuguese: Desastre, catástrofe, grande desgrana, calamidade, reves, sinistro (Dicionario Lingua Portuguesa, 1999)

French: Desastre, catastrophe, calamite, malheur (Larousse, 1979)

Japanese: Geki no daidan'en, saigai, dai, fuko, sainan (Hyojun Romaji Kai, Dictionary, 1961)

Italian: Disastro

Some preliminary conclusions

The noun *disaster* has magical, astral, supernatural and religious connotations in the Romance languages (Spanish, French, Italian, Portuguese) and in English, due perhaps to the fact that, although English is not a Romance language, it has borrowed many words from Latin.

In many other languages (German, Russian, Servo-Croatian, Polish, Czech) the translation of the noun *disaster* comes from the translation of the English word of Greek origin *catastrophe*, i.e. *katastrophe*.

In other languages (Swedish, Dutch, Arabic, Turkish, Japanese, Vietnamese, Korean, among others) its meaning is related to concepts such as "great loss", "terrible happening", "big accident", "something dreadful you should run away from", "sudden great misfortune."

From the above it can be construed that the meanings and connotations of the term *disaster* in the various languages analyzed do not necessarily relate to its origins, as can be seen from the conclusion under 1: even though English is not a Romance language, its translation stems from Latin and is, therefore, similar to desastre, disastro, instead of following the way of other Germanic languages that stem from the Greek *katastrophe*.

The meaning and derivation of words may tell us something about how people originally perceived such meaning and/or derivation although this perception can be modified with time, as is the case with the word *disaster* as more and more people have moved on from the magic, religious connotation of term.

A final word

As stated in the Introduction, this paper does not attempt to be a learned treatise on the etymology and meaning of the word *disaster* in languages other than English. I would leave that task to the linguists and etymologists.This paper is just an attempt by a lay person interested in words and disasters, who for more than fifty years has experienced the problems of translation and who firmly believes that the dictum *Traduttore, traditore* has a lot of truth in it.

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Tsunami Glossary, Part two (ITIC-UNESCO, 2003)

B

Breaker…..a sea-surface wave that has become so steep (wave steepness of 1/7) that the crest outraces the body of the wave and it collapses into a turbulent mass on shore or over a reef. Breaking usually occurs when the water depth is less than 1.28 times the wave height. Roughly, three kinds of breakers can be distinguished, depending primarily on the gradient of the bottom: (a) spilling breakers (over nearly flat bottom) which form a foamy patch at the crest and break gradually over a considerable distance; (b) plunging breakers (overly fairly steep bottom gradient) which peak up, curl over with a tremendous overhanging mass and then break with a crash; (c) surging breakers (over very steep bottom gradients) which do not spill or plunge but surge up the beach face. Waves also break in deep water if they build too high while being generated by the wind, but these are usually short-crested and are termed *whitecaps*.

Breakwater…..an offshore structure such as a wall that is used to protect a harbor or beach from the force of waves. ♦

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So, it *wasn't* a surprise

Mitigating the effects of large subduction-zone earthquakes in Western Sumatra

By
Kerry Sieh, Catherine Stebbins, Danny H. Natawidjaja, and Bambang W. Suwargadi

EOS, American Geophysical Union Transactions, v. 85, no. 47, p. F1289.
Published November 2004

No giant earthquakes have struck the outer-arc islands of western Sumatra since the sequence of 1797, 1833 and 1861. Paleoseismic studies of coral microatolls reveal that failure of the subduction interface occurs in clusters of such earthquakes about every 230 years. Thus, the next such sequence may well be no more than a few decades away. In the meantime, GPS measurements and paleogeodetic observations show that the islands continue to submerge, dragged down by the downgoing oceanic slab, in preparation for the next failures of the subduction interface. Uplift of the islands and seafloor one to two meters during large events leads to large tsunamis and substantial changes in the coastal environments of the islands, including the seaward retreat of fringing reef, beach and mangrove environments. Having spent a decade characterizing the seismic history of western coastal Sumatra, we are now beginning to work with the inhabitants of the islands and the mainland coast to mitigate the associated hazards. Thus far, we have begun to create and distribute posters and brochures aimed at educating the islanders about their natural tectonic environment and guiding them in preparing for future large earthquakes and tsunamis. We are also installing a continuous GPS network, in order to monitor ongoing strain accumulation and possible transients. ♦

NEWS

Law Includes Strengthening of U.S. Tsunami Warning Capabilities

On May 11, the president signed into law the Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Tsunami Relief, 2005 (Public Law 109-13), which includes $17.24 million for the National Oceanic and Atmospheric Administration (NOAA) to support the expansion and enhancement of NOAA tsunami warning capabilities and $8.1 million for the U.S. Geological Survey to accelerate improvements of its seismic monitoring capabilities and information delivery systems. Additionally, the new law provides $656 million for tsunami recovery and rehabilitation efforts in the Indian Ocean. The complete text of Public Law 109-13 is available in any federal repository library and on the Library of Congress Web site at http://thomas.loc.gov/.

From: Natural Hazards Observer, v. 29, no. 6, p. 8.

Law Makes FEMA Mitigation Grants Tax-Free

On April 15, the president signed Public Law 109-7, making mitigation grants from the Federal Emergency Management Agency (FEMA) tax-free. Prior to passage of this law, these grants were considered taxable income by the Internal Revenue Service. This tax code change applies to mitigation grants past, present, and future.

The complete text of Public Law 109-7 is available in any federal repository library and on the Library of Congress Web site at http://thomas.loc.gov/.

From: Natural Hazards Observer, v. 29, no. 6, p. 7.

EMD tsunami materials receive international attention

Tsunami education materials from the Washington Emergency Management Division (EMD) are now in wide circulation throughout the nations bordering the Pacific and Indian Oceans.

Following last December's devastating earthquake and tsunami in the Indian Ocean region, George Crawford, EMD's earthquake program manager, authorized the United Nations' International Oceanic Commission and the International Tsunami Center in Hawaii to use EMD tsunami materials for international public education programs.

The materials included brochures and the popular "Run to High Ground" video that uses Hoh Tribal Nation storyteller Viola Riebe to educate children and adults on the earthquake and tsunami hazard along the Northwest coast. Crawford said the video's story about how an Indian boy sees warning signs in nature and warns his village of impending earthquake and tsunami is very compelling in village cultures of the Indian and Pacific Ocean areas.

"The video's preparedness message is very powerful and easily translates across different cultures and languages," said Crawford.

The International Tsunami Center program plans to take the video and other EMD educational materials this summer to 23 countries in the Indian and Pacific Ocean areas and the Caribbean Sea region.

From: Emergency Responder, May-June 2005, p. 2.

Tsunami video earns 2005 WSSPC excellence award

Washington Emergency Management Division's "Run to High Ground" video will receive the 2005 Award in Excellence in Mitigation and Outreach to Schools at the Western States Seismic Policy Council (WSSPC) annual conference next September. The video, which was produced in 2004, uses Hoh Tribal Nation storyteller Viola Reibe to educate both children and adults about coastal earthquake and tsunami hazards and is now being used internationally for educational purposes.

From: Emergency Responder, May-June 2005, p. 2.

Tsunami review set for July 8, 2005

A series of discussions between local, state and federal officials followed the June 14 Pacific Coast tsunami warning from the National Oceanic and Atmospheric Administration's (NOAA) Alaska Tsunami Warning Center. The Alaska center issued the warning after an earthquake with an initial magnitude of 7.4 struck about 7:50 p.m. about 90 miles southwest of the California coastal town of Crescent City. State Emergency Operations Officers relayed the warning to affected local agencies through both the National Alert and Warning System and the law enforcement Access System. The access message was sent at 7:58 p.m. and the NAWAS warning was sent at 8:10 p.m.

The notices set off a barrage of telephone calls to local 9-1-1 centers and to the State Emergency Operations Center (EOC) at Camp Murray. Paul McNeil, state EOC supervisor, notes that state emergency operations officers handled 152 calls in a little more than an hour while transmitting the warning message through three different systems and calling each of the eight coastal Indian nation organizations.

"We feel the overall response went well in Washington," said Maj. Gen. Timothy Lowenberg, director, Washington Military Department., "but we also see places where we can improve the system." At Lowenberg's direction, EMD scheduled a July 8 meeting of the State and Local Workgroup at Camp Murray.

From: Emergency Responder, May-June 2005, p. 4, 7.

EMD, FEMA to test warning system

Washington Emergency Management Division (EMD) is one of two jurisdictions in the nation that will participate in a Federal Emergency Management Agency (FEMA) pilot project to improve warning capabilities.

As approvied in April 2005, the integrated Alert and Warning System Pilot Project will build upon other warning systems that are supported by FEMA and the Information Analysis and Infrastructure Project Directorate of the Department of Homeland Security.

Major goals of the pilot project are to:
* Create and/or collect warnings from multiple sources and jurisdictions via a common alerting protocol,
* Distribute individual warnings to the appropriate federal, regional, state and local all-hazard alert installations,
* Disseminate and deliver individual warnings to the appropriate government officials, warning broadcasters, and federal public subscribers using modern technology that complements the existing Emergency Alert System infrastructure,
* Complement the Graphic User interface being developed by the Pacific Northwest National Laboratory for the National Oceanic and Atmospheric Administration (NOAA) Hazcollect Project.

Don Miller, supervisor of EMD's telecommunication section, stated EMD's participation in this pilot project will ensure that our state will have input into the development of a national system that would include these features:
* Compatibility with our existing systems to protect existing investments,
* Input from such groups as the Washington State Emergency Communications Committee, local emergency managers, the Washington State Association of Broadcasters, the regional NOAA weather office warning systems managers, U.S. Geological Survey, the government of Canada, and EMD management,
* Compatibility with the NOAA Hazcollect project, Mystatesusa internet information system, and EMnet or other web-based emergency management information system.

Finally, Miller stated the project will enable Washington to advance to a higher level of warning capability than currently is in use.

From: Emergency Responder, May-June 2005, p. 5.

How Washington deals with tsunamis

This article was found in the British geological newsletter DOWN TO EARTH (issue no. 51, June 2005, p. 30), edited by Chris Darmon:

"In sharp contrast to the situation that faced the near 300,000 victims of the Asian [tsunami,] I recently discovered this leaflet that describes in detail the evacuation procedure and routes for the Grays Harbor and Pacific Counties area of Washington State.

The leaflet includes safety tips as well as information about evacuation routes and procedures. The following would have saved so many lives on December 26th 2004:
* Never go to the coast to watch a tsunami.
* Tsunamis move faster than a person can run. If you are camping on or near a beach, you may have to abandon your campsite to go inland or to higher ground to save your life.
* Do not return to shore after the first wave. Wait for Emergency Management officials to give the "All Clear" before your return.
* If you see an unexpected rise or fall in the coastal water, a tsunami may be approaching. Do not wait—instead move inland or uphill as quickly as possible."

WSSPC member agency reports from the Inland State

WSSPC member agencies annually submit reports on their earthquake program activities. The Inland States' reports were printed in the Spring 2005 issue of *EQ – Earthquake Quarterly.* Reports from WSSPC coastal member agency states were published in the Winter 2005 issue of *EQ* and may be found on the WSSPC website at www.wsspc.org/Members.

PUBLICATIONS

10th Annual Disaster Resource Guide
(2005-2006) is now available, free, from PO Box 15243, Santa Ana, California 92735; 714 558-8940; fax 714 558-8901; www.disaster-resource.com.

It's primary focus is business continuity, with information about products and services for the business community's emergency planning and recovery.

Identification and Analysis of Factors Affecting Emergency Evacuations.
L. J. Dotson, J. Jones (Sandia National Laboratories). 2005. Vol. I 61 pp, Vol. II (appendices) 411 pp. Available free online from the U.S. Nuclear Regulatory Commission, Office of Nuclear Security and Incident Response, Washington, DC 20555. http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6864/.

The objective of this study was to assess the emergency evacuation process in the United States, including evaluating evacuation experience (e.g., time to complete evacuation, traffic issues, deaths or injuries, etc.) and identifying critical factors affecting emergency evacuations (e.g., training, drills, preparedness, ad hoc versus preplanned, etc.). The study examined public evacuations of 1,000 or more persons in response to natural disasters, technological hazards, and malevolent acts in the United States between January 1, 1990, and June 30, 2003. Fifty evacuation incidents were selected for case study analysis. Findings revealed that large-scale evacuations in the United States have been very effective and successfully saved lives and reduced the potential number of injuries associated with the corresponding hazard. This analysis is featured in Volume I. Volume II contains the supporting data and information.

From: Natural Hazards Observer, v. 29, no. 6, p. 23.

Topics: Annual Review of North American Natural Catastrophes 2004
2005. 50 pp. Free. Available from American Re-Insurance Company (Am Re), 555 College Road East, Princeton, NJ 08543; (609) 243-5607; e-mail: jbradley@amre.com; http://www.amre.com/content/rl/topics04_amre.pdf.

Written by American Re in cooperation with Munich Re, this publication provides information about significant U.S. natural catastrophes and related insurance issues in 2004. It is intended to provide insight and perspective about recent natural catastrophes as well as natural hazard risk and the underlying perils that influence the property and casualty insurance industry. This edition features articles on the impacts and lessons learned from Hurricanes Charley, Frances, Ivan, and Jeanne; the January 2004 freeze in the Northeast, the thunderstorm events of 2004, and the U.S. tsunami hazard.

From: Natural Hazards Observer, v. 29, no. 6, p. 23-24.

When Their World Falls Apart: Helping Families and Children Manage the Effects of Disaster
Lawrence B. Rosenfeld, Joanne S. Caye, Ofra Ayalon, and Mooli Lahad. ISBN 0-87101-358-4. 2004. 488 pp. $54.99. Available from the National Association of Social Workers Press, 750 First Street NE, Suite 700, Washington, DC 20002; (800) 227-3590; http://www.naswpress.org/.

This book is a comprehensive examination of the effects of disasters on children and families from cognitive and behavioral, family systems, and ecological perspectives. It celebrates the resilience of people in their responsiveness to adversity and serves as a guide for action when crises disrupt lives and routine services. The book's three parts cover understanding disasters, the effects of disasters, and disaster intervention. An accompanying CD-ROM features video clips of families affected by disaster.

From: Natural Hazards Observer, v. 29, no. 6, p. 24.

Disaster Reduction: Living in Harmony with Nature
Julio Kuroiwa. ISBN 9972-9999-0-4. 2004. 513 pp. $79.00. Available from the International Code Council, 4051 West Flossmoor Road, Country Club Hills, IL 60478; (800) 786-4452; http://www.iccsafe.org/.

A product of the International Decade of Natural Disaster Reduction, this book takes a multidisciplinary and practical approach to disaster reduction, blending science with humanitarianism. Contents include discussions on sustainable cities; geological, climatic, and technological hazards; economic and social impact of disasters; and reduction of social vulnerability.

From: Natural Hazards Observer, v. 29, no. 6, p. 24.

Developing Tsunami-Resilient Communities: The National Tsunami Hazard Mitigation Program.
E.N. Bernard, editor. ISBN 1-4020-3353-2. 2005. 186 pp. $99.00. Available from Springer New York, 233 Spring Street, New York, NY 10013; (212) 460-1500; e-mail: service-ny@springer-sbm.com; http://www.springeronline.com/.

This volume chronicles the development and accomplishments of a joint state/federal partnership that was forged to reduce tsunami hazards along U.S. coastlines—the National Tsunami Hazard Mitigation Program. By integrating hazard assessment, warning guidance, and mitigation activities, the program has created a roadmap and a set of tools to make communities more resilient to local and distant tsunamis. Among the set of tools are tsunami forecasting, educational experiments, early alerting systems, and design guidance for tsunami-resilient communities. The book was written for coastal community planners, emergency managers, responders, policy makers, educators, and researchers and practitioners in the field of natural hazards impacts and risk assessment.

From: Natural Hazards Observer, v. 29, no. 6, p. 25.

WEBSITES

http://www.asce.org/files/pdf/Tsunami.pdf

This article from the American Society of Civil Engineers' journal ***Civil Engineering*** examines the possibility of a tsunami, such as the one that struck in the Indian Ocean in December, happening in the United States, off the coast of Southern California in particular.

From: Natural Hazards Observer, v. 29, no. 6, p. 18

http://www.eeri.org/lfe/clearinghouse/sumatra_tsunami/presentation.html

The Earthquake Engineering Research Institute (EERI) has released "The Great Sumatra Earthquake and Indian Ocean Tsunami," a comprehensive PowerPoint presentation intended for use by individuals who are giving presentations to colleagues, community groups, and others. It explains the origins of the earthquake and tsunami and documents the damage they caused. It also includes slides on tsunamis in the United States and a discussion of tsunami risk reduction methods.

From: Natural Hazards Observer, v. 29, no. 6, p. 18

http://www.unisdr.org/ppew/tsunami/ppew-tsunami.htm

This new section of the United Nations International Strategy for Disaster Reduction Platform for the Promotion of Early Warning Web site provides information on developments pertaining to the organization of a tsunami early warning system for the Indian Ocean. It also contains a concise summary of information on tsunamis and links to other tsunami Web sites.

From: Natural Hazards Observer, v. 29, no. 6, p. 18

http://ioc.unesco.org/indotsunami/mauritius05/mauritius05_outcome.htm

The result of the Second International Coordination Meeting for the Development of a Tsunami Warning and Mitigation System for the Indian Ocean, the Mauritius Declaration posted here, complements the Paris Communiqué issued in March and further outlines the way forward toward the development of a tsunami warning system for the region.

From: Natural Hazards Observer, v. 29, no. 6, p. 19

http://www.oxfam.org.uk/what_we_do/issues/conflict_disasters/bn_tsunami_women.htm

This report from aid agency Oxfam International about the impact of the Indian Ocean tsunami on women shows that up to four times as many females as males may have been killed by the tsunami. It examines some of the reasons why and what can be done to address the disproportionate impact on women in general.

From: Natural Hazards Observer, v. 29, no. 6, p. 19

http://www.e-aceh.org/

eAceh.org is an effort by the government of Indonesia and the donor community to bring together the stakeholders rebuilding lives, livelihoods, and communities in Aceh and northern Sumatra devastated by December's earthquake and tsunami. Information from all government agencies, international institutions, bilateral donors, international NGOs, and local Lembaga Swadaya Masyakarat participating in the rehabilitation and reconstruction of Aceh will be made available on this site.

From: Natural Hazards Observer, v. 29, no. 6, p. 19

http://www.adrc.or.jp/publications/Srilanka_survey/en/Index.html

The Asian Disaster Research Center conducted a field survey on the awareness of disaster risk in the Galle district of Sri Lanka to identify the current situation and characteristics of the community's capacity to respond to natural disasters. The survey was conducted for the purpose of proposing a strategy for dissemination of disaster knowledge and raising public awareness for reducing the negative impact of natural hazards. The results are available here.

From: Natural Hazards Observer, v. 29, no. 6, p. 19

http://www.mipt.org/pdf/CRS_RL32803.pdf

The National Preparedness System: Issues in the 109th Congress from the Congressional Research Service provides background information on the six National Preparedness System documents and identifies related issues, such as compliance and federalism, that may be subject to congressional debate.

From: Natural Hazards Observer, v. 29, no. 6, p. 17

http://www.nyc.gov/html/oem/pdf/seniors_disabilities_english.pdf
http://www.nyc.gov/html/oem/pdf/rny_smallbiz.pdf

As part of its ongoing effort to help all New Yorkers better prepare for emergencies, the New York City Office of Emergency Management has released *Ready New York for Seniors and People with Disabilities* and *Ready New York: Emergency Planning for Small and Mid-Sized Companies***.**

From: Natural Hazards Observer, v. 29, no. 6, p. 17

http://www.riskinstitute.org/newsite/uploads/PDR_FinalReport_04_22_05.pdf

This is the final report on the Oregon Natural Hazards Workshop's (ONHW) Public Entity Risk Institute-supported three year project to coordinate the implementation of the Institute of Business & Home Safety Showcase State program in Oregon. Learn about the challenges and opportunities of coordinating a statewide disaster mitigation effort and how ONHW plans to continue promoting disaster mitigation in Oregon.

From: Natural Hazards Observer, v. 29, no. 6, p. 17

http://www.pdc.org/atlas/html/atlas-init.jsp

The Pacific Disaster Center has redesigned and enhanced its Web-based hazards atlas to support disaster management and humanitarian assist-ance communities in the Asia-Pacific region and Hawaii. The updated atlas provides a geospatial framework through which a wealth of hazards-related information can be viewed, including real-time and historical tropical cyclone tracks, earthquake locations, wildfires, and tsunami runup zones.

http://nhss.cr.usgs.gov/

The U.S. Geological Survey's (USGS) new Natural Hazards Support System (NHSS) is a Web-based tool that helps monitor, respond to, and analyze natural hazards events around the world. It provides a one-stop, Web-based portal to current natural hazards information, geospatial data, and other data directly from expert sources. This Web-based synthesis of information provides decision makers and the public with a tool to track numerous natural hazard events as they are happening.

USGS NHSS contains dynamic, near real-time natural hazards information from a wide range of sources, such as the USGS National Earthquake Information Center, the National Oceanic and Atmospheric Administration (NOAA); the National Hurricane Center; the National Interagency Fire Center; and NOAA's National Data Buoy Center. See what the new tool can do for you at http://nhss.cr.usgs.gov/.

From: Natural Hazards Observer, v. 29, no. 6, p. 10

CONFERENCES/ SYMPOSIA

August 28-31, 2005

2005 NEMA Annual Conference. Organizer: National Emergency Management Association (NEMA). Anchorage, Alaska. This conference provides an opportunity for emergency managers to come together to discuss the many challenges that face the community today, share solutions, grow professionally, and network with peers. Attendees will hear from those involved in shaping the future of homeland security and emergency management, strengthen relationships with partner organizations, and discuss NEMA's views on all-hazards emergency preparedness. For more information, contact

NEMA, PO Box 11910, Lexington, KY 40578; (859) 244-8000; e-mail: nemaadmin@csg.org; http://www.nemaweb.org/?1331.

From: Natural Hazards Observer, v. 29, no. 6, p. 13.

September 11-14, 2005

WSSPC Annual Conference, "NEHRP's Next Decade: Challenges for Implementation," The Grove Hotel & Boise Centre, Boise, Idaho. "Revisit the NEHRP goals and what the goals support—reduced exposure to loss of life, infrastructure, economies, and resources—in light of national realities: western earthquakes, rural earthquakes, and earthquakes in cash-strapped states and communities. Point to strategies for strengthening NEHRP and WSSPC."

For more information: http://www.wsspc.org/Events/ac2005/
From: EQ—Earthquake Quarterly, Spring 2005, p. 10.

October 4-7, 2005

18th Emergency Preparedness Conference: Community Resilience; A Future for All**.** Sponsors: City of Burnaby, City of Vancouver, Insurance Bureau of Canada, Justice Institute of British Columbia, Public Safety and Emergency Preparedness Canada, Ministry of Health Services, Emergency Social Services, Provincial Emergency Program, University of British Columbia, Royal Canadian Mounted Police "E" Division. Vancouver, British Columbia. This conference will emphasize community resiliency in the face of disasters through community involvement and planning by building on the action plan from last year's conference. The goal of the action plan was to provide tools to help communities become disaster resilient. The program will include six workshops: Public Awareness and Education, Psychosocial Impact on Responders, Volunteer Management, Community Health Care Resources, Critical Infrastructure, and Community Emergency Programs. For more information, contact the Emergency Preparedness Conference, 900 Heatley Avenue, Vancouver, British Columbia V6A 3S7, Canada; (604) 665-6097; e-mail: info@epconference.ca; http://www.epconference.ca/.

From: Natural Hazards Observer, v. 29, no. 6, p. 15.

October 26-27, 2005

Extreme Natural Hazards**.** Organizer: Royal Society. London, United Kingdom. This meeting will focus on extreme geophysical and astrophysical hazards, including earthquakes, supervolcanic eruptions, tsunamis, near Earth objects, and giant landslides. Speakers will discuss the frontiers and challenges in the science of extreme natural hazards as well as related topics, such as prediction, forecasting, monitoring, and technological innovations. The meeting will assess the role of the international scientific community and how these efforts can be better coordinated, integrated, and funded to improve the ability to anticipate and mitigate the effects of extreme events. Issues of the acces-sibility of relevant science to poor nations with limited scientific infrastructure and expertise will also be discussed. For more information, contact Hannah Jemmett; +44 (0) 207 451 2575; e-mail: discussion.meetings@royalsoc.ac.uk; http://www.royalsoc.ac.uk/event.asp?id=3177&month=10,2005.

From: Natural Hazards Observer, v. 29, no. 6, p. 16.

November 12-16, 2005

IAEM 2005 Annual Conference and EMEX. Sponsor: International Association of Emergency Managers (IAEM). Phoenix, Arizona. The purpose of this conference is to provide a forum to discuss current trends, topics, and the latest tools and technology in emergency management and homeland security, and to advance IAEM committee work. Sessions encourage stakeholders at all levels of government, the private sector, public health, and related professions to exchange ideas on collaborating to protect lives and property from disaster. Members of IAEM, disaster professionals, and other officials with a role in homeland security and emergency management are invited to attend. For more information, contact the IAEM, 201 Park Washington Court, Falls Church, VA 22046; (703) 538-1795; e-mail: info@iaem.com; http://www.iaem.com/events/annual/intro.htm.

From: Natural Hazards Observer, v. 29, no. 6, p. 16. ♦

Added to the NTHMP Library
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Note: These, and all our tsunami materials, are included in the online (searchable) catalog at http://www.dnr.wa.gov/geology/washbib.htm.
Type 'tsunamis' in the Subject field to get a full listing of all the tsunami reports and maps in the collection.

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"RESCUING OUR EMERGENCY SYSTEM"

San Francisco Chronicle
OPEN FORUM
Annemarie Conroy
June 29, 2005

Go to this website for a critique of the State's (California) and San Francisco's response to the tsunami warning of June 14, 2005.

http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2005/06/29/EDGKVDFNKQ1.DTL

Sent in by Wayne Johnston

UNJLC INDIAN OCEAN TSUNAMI BULLETINS

The United Nations Joint Logistics Centre has been issuing these bulletins since the Sumatra tsunami occurred. They illustrate another aspect of tsunami recovery: the logistics of international aid. The entire set can be accessed at http://e-aceh.bappenas.go.id/index.php?module=pagesetter&tid=8&filter=category:eq:22.

Bulletin 45 (Jul. 13, 2005) http://e-aceh.bappenas.go.id/Pledge/files/UNJLC_IOT_bulletin%2045_050713.pdf

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California Office of Emergency Services
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(916) 845-8911; Fax (916) 845-8910
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Hawaii State Civil Defense, Dept. of Defense
3949 Diamond Head Road
Honolulu, HI 96816-4495
(808) 734-2161; Fax (808) 733-4287
http://www.scd.state.hi.us

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(503) 378-2911, ext. 225; Fax (503) 588-1378
http://www.oregon.gov/osp/oem

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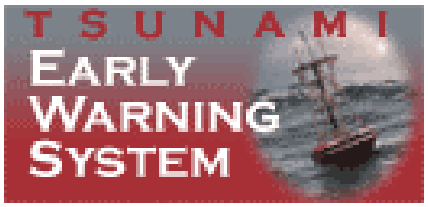
updated 2-15-2005



TSUNAMI COASTAL FLOOD MAPPING FOR PUERTO RICO AND ADJACENT ISLANDS
http://poseidon.uprm.edu/

At the website, the main report is a 100mb pdf file. To download click right mouse button and select "Save.."

Appendix A - Anegada Passage.pdf	Appendix G - North Platform.pdf
Appendix B - Eastern Dominican Republic.pdf	Appendix H - Puerto Rico Trench.pdf
Appendix C - Leeward Islands.pdf	Appendix I - Puerto Rico West to Southeast.pdf
Appendix D - McCann Faults.pdf	Appendix J - Septentrional.pdf
Appendix E - Mona Canyon.pdf	Appendix K - Sombrero.pdf
Appendix F - Muertos Trough.pdf	Appendix L - 19 Degrees North .pdf

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30 June 2005: IOC Assembly formally establishes Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS)

The IOC Assembly, during its twenty-third Session (21-30 June 2005), formally established the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS) through Resolution IOC-XXIII-12.

Full text of the 23rd session and establishment of ICG/IOTWS are available online at http://ioc.unesco.org/indotsunami/IOC23/ioc23.htm ♦

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From: http://www.pmel.noaa.gov/tsunami-hazard/tsuhaz.htm

Updated July 29, 2005♦

VIDEO RESERVATIONS

To reserve tsunami videos, contact *TsuInfo Alert* Video Reservations, Lee Walkling, Division of Geology and Earth Resources Library, 1111 Washington St. SE, MS 47007, Olympia, WA 98504-7007; or e-mail lee.walkling@wadnr.gov

Adventures of Disaster Dudes (14 min.). Preparedness for preteens. American Red Cross.

The Alaska Earthquake, 1964 (20 min.) Includes data on the tsunamis generated by that event.

Business Survival Kit for Earthquakes & Other Disasters; What every business should know before disaster strikes (27 min.). Global Net Productions for the Cascadia Regional Earthquake Workgroup, 2003. With CD disaster planning toolkit & other data.

Cannon Beach Fire District Community Warning System (COWS) (21 min.) Explains why Cannon Beach chose their particular warning system.

Cascadia: The Hidden Fire–An Earthquake Survival Guide (10 min.). Global Net Productions, 2001. A promo for a documentary about the Cascadia subduction zone and the preparedness its existence demands of Alaska, Oregon and Washington states. Includes mention of tsunamis.

Disasters are Preventable (22 min.) Ways to reduce losses from various kinds of disasters through preparedness and prevention.

Disaster Mitigation Campaign (15 min.). American Red Cross; 2000 TV spots. Hurricanes, high winds, floods, earthquakes.

Earthquake…Drop, Cover & Hold (5 min.). Washington Emergency Management Division. 1998.

Forum: Earthquakes & Tsunamis (2 hrs.). CVTV-23, Vancouver, WA (January 24, 2000). 2 lectures: Brian Atwater describes the detective work and sources of infor-mation about the Jan. 1700 Cascadia earthquake and tsunami; Walter C. Dudley talks about Hawaiian tsunamis and warning systems.

***International Tsunami Information Centre, 2004, Tsunami warning evacuation news clips and video footage, UNESCO/IOC International Tsunami Information Centre, 1 **DVD**, 12 min.

Killer Wave: Power of the Tsunami (60 min.).National Geographic video.

Mitigation: Making Families and Communities Safer (13 min.) American Red Cross.

Not Business as Usual: Emergency Planning for Small Businesses, sponsored by CREW (Cascadia Regional Earthquake Workgroup) (10 min.), 2001. Discusses disaster preparedness and business continuity. Although it was made for Utah, the multi- hazard issues remain valid for everyone. Websites are included at the end of the video for further information and for the source of a manual for emergency preparedness for businesses.

Numerical Model Aonae Tsunami–7-12-93 (animation by Dr. Vasily Titov) and Tsunami Early Warning by Glenn Farley, KING 5 News (The Glenn Farley portion cannot be rebroadcast.)

Ocean Fury--Tsunamis in Alaska (25 min.) VHS and **DVD**. Produced by Moving Images for NOAA Sea Grant College Program, 2004.

The Prediction Problem (58 min.) Episode 3 of the PBS series "Fire on the Rim." Explores earthquakes and tsunamis around the Pacific Rim

Protecting Our Kids from Disasters (15 min.) Gives good instructions to help parents and volunteers make effective but low-cost, non-structural changes to child care facilities, in preparation for natural disasters. Accompanying booklet. Does NOT address problems specifically caused by tsunamis.

The Quake Hunters (45 min.) A good mystery story, explaining how a 300-year old Cascadia earthquake was finally dated by finding records in Japan about a rogue tsunami in January 1700

Raging Planet; Tidal Wave (50 min.) Produced for the Discovery Channel in 1997, this video shows a Japanese city that builds walls against tsunamis, talks with scientists about tsunami prediction, and has incredible survival stories.

Raging Sea: KGMB-TV Tsunami Special. (23.5 min.) Aired 4-17-99, tsunami preparedness in Hawaii.

The Restless Planet (60 min.) An episode of "Savage Earth" series. About earthquakes, with examples from Japan, Mexico, and the 1989 Loma Prieta earthquake.

Run to High Ground (14 min.). Produced by Global Net Productions for Washington Emergency Management Division and Provincial Emergency Program of British Columbia, 2004. Features storyteller Viola Riebe, Hoh Tribe. For K-6 grade levels. Have video and **DVD** versions.

Tsunami and Earthquake Video (60 min.). "Tsunami: How Occur, How Protect," "Learning from Earthquakes," "Computer modeling of alternative source scenarios."

Tsunami: Killer Wave, Born of Fire (10 min.). NOAA/ PMEL. Features tsunami destruction and fires on Okushiri Island, Japan; good graphics, explanations, and safety in-formation. Narrated by Dr. Eddie Bernard, (with Japanese subtitles).

Tsunami: Surviving the Killer Waves (13 min.). 2 versions, one with breaks inserted for discussion time.

Tsunami Chasers (52 min.). Costas Synolakis leads a research team to Papua New Guinea to study submarine landslide-induced tsunamis. Beyond Productions for the Discovery Channel.

Tsunami Evacuation PSA (30 sec.). DIS Interactive Technologies for WA Emergency Management Division. 2000.

Understanding Volcanic Hazards (25 min.). Includes information about volcano-induced tsunamis and landslides.

***UNESCO/IOC International Tsunami Information Centre, 2005, U.S. National Tsunami Hazard Mititgation Program public information products—B-roll footage, tsunami science, warnings, and preparedness: UNESCO/IOC International Tsunami Information Centre, 1 **DVD,** 57 min.

The Wave: a Japanese Folktale (9 min.) Animated film to start discussions of tsunami preparedness for children.

Waves of Destruction (60 min.) An episode of the "Savage Earth" series. Tsunamis around the Pacific Rim.

Who Wants to be Disaster Smart? (9 min.). Washington Military Department/Emergency Management Division. 2000. A game show format, along the lines of *Who Wants to be a Millionaire*?, for teens. Questions cover a range of different hazards.

The Wild Sea: Enjoy It...Safely (7 min.) Produced by the Ocean Shores Wash. Interpretive Center, this video deals with beach safety, including tsunamis. ♦

Two new DVDs have asterisks in front of the titles.

Updated July 25, 2005

Eerie Underwater Recording of Deadly Indonesian Earthquake

By Robert Roy Britt, LiveScience Senior Writer
posted: 22 July 2005, 12:24 pm ET
http://www.livescience.com/forcesofnature/050722_earthquake_sound.html

Sound from last December's huge tsunami-causing earthquake was picked up by underwater micro-phones designed to listen for nuclear explosions.

Scientists this week released an audio file of the frighteningly long-lasting cracks and splits along the Sumatra-Andaman Fault in the Indian Ocean. The spine-tingling hiss and rumble is an eerie reminder of the devastation and death that is still being tallied in the largest natural disaster in modern times.

At least 200,000 people are thought to have died as a result of the magnitude 9.3 earthquake, the tsunami, and the lack of food, drinkable water and medical supplies that followed.

The audio recording of the quake starts out silent. A low hiss begins and the intensity builds gradually to a rumbling crescendo. Then it tails off but, frighteningly, builds again in waves as Earth continues to tremble.

The audio file is sped up 10 times to make it easier to hear. As it was recorded, the sound was at the lower threshold of human hearing, but it could have been noted by someone paying attention.

"If you were diving even hundreds of miles away you could hear this," said study leader Maya Tolstoy of Columbia University's Lamont-Doherty Earth Observatory. "You would hear it as sort of a 'boom.'"

Future help

An analysis of the recording suggest a new way to monitor earthquakes in near real-time, providing critical information about an earthquake's intensity and potential hazard that could supplement seismograph data, which typically requires hours and even days to properly analyze.

"We were able to constrain some details such as the speed and duration of the rupture more accurately than traditional seismic methods," Tolstoy said. "Moreover, we found the earthquake happened in two distinct phases, with faster rupture to the south and slower to the north, almost as if there were two back-to-back events."

Tolstoy told *LiveScience* that the recorded sounds raced from the rupture more quickly than the tsu-nami wave. The entire quake's sounds took about 45 minutes to reach the hydrophone. Were a system set up to use such data, analysis might be done in about 15 minutes, Tolstoy said.

The tsunami took hours to reach some locations.

An analysis of the data is detailed in the July/August edition of the journal *Seismological Research Letters*.

Sound travels

It is not surprising the sounds were picked up. An earthquake releases energy of varying types. Its seismic waves -- those that shake the ground -- are technically just a variation on sound waves. And sound travels well in water. Whales can hear each other call from more than 1,000 miles away.

Tolstoy said people at sea have heard the rumblings of distant volcanoes when the sound hits the hull of a ship.

And this was no small earthquake. It ruptured the planet along 750 miles (1,200 kilometers) of fault. Scientists estimate the Indian plate slipped 33-50 feet (10 to 15 meters) under the Burma microplate. The fault shook for at least eight minutes. A typical large earthquake lasts 30 seconds or so.

Earth's very gravity balance was altered and the North Pole shifted by an inch.

The recorded data was provided in March to scientists by the International Monitoring System of the Comprehensive Nuclear Test Ban Treaty. Tolstoy and her colleague, DelWayne Bohnenstiehl, converted the data to make the new audio file. Tolstoy hopes that in the future scientists will gain easier and earlier access to such data.

"There is an opportunity here to make a contribution to international disaster monitoring, as well as help us better understand earthquakes and tsunamis and potentially mitigate these events in the future." she said. "It makes sense to let others listen in."

The sound file is here. (Link on webpage to 2:20 minute sound recording.) The website also has a spectrogram of the data, showing energy released, with red being the most. A peak in energy is seen about 300 seconds into the event. ♦

Sent in by Wayne Johnston

TSUNAMI WATCH INFORMATION NUMBER 001
ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)
ISSUED AT 1602 24 JUL 2005 (UTC)

1.EARTHQUAKE INFORMATION
ORIGIN TIME : 1542 24 JUL 2005 (UTC)
COORDINATES : 8.7 NORTH 92.1 EAST
LOCATION : NICOBAR ISLANDS, INDIA, REGION
MAGNITUDE : 7.3

2.EVALUATION
THERE IS A POSSIBILITY OF A DESTRUCTIVE LOCAL TSUNAMI IN THE INDIAN OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME ONE HOUR OR LESS
INDIA:
ALL COASTS OF ANDAMAN AND NICOBAR ISLANDS
INDONESIA:
INDIAN OCEAN COAST OF SUMATRA
MALACCA COAST OF SUMATRA

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA AND INDICATES THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI ARRIVAL TIME.

*THIS WILL BE THE FINAL INFORMATION UNLESS THERE ARE CHANGES ABOUT THE POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI TRAVEL TIME BY RE-EVALUATION OF THE EARTHQUAKE OR THERE ARE REPORTS ON TSUNAMI OBSERVATIONS.

****
TSUNAMI WATCH INFORMATION (TWI) IS PROVIDED TO THE COUNTRIES OF THE INDIAN OCEAN REGION FROM JMA IN COOPERATION WITH PTWC OF US ON AN INTERIM BASIS PRIOR TO THE ESTABLISHMENT OF THE TSUNAMI EARLY WARNING SYSTEM IN THE REGION. TWI SHOULD BE REGARDED AS A REFERENCE MATERIAL FOR THE DISASTER PREVENTION AUTHORITIES OF THE RECIPIENT COUNTRIES TO ISSUE TSUNAMI WARNINGS ON THEIR OWN INITIATIVE AND RESPONSIBILITY.
****

WEPA43 PAAQ 241559
TIBWCA

TO TSUNAMI WARNING SYSTEM PARTICIPANTS IN ALASKA/BRITISH COLUMBIA/WASHINGTON/OREGON/ CALIFORNIA
FROM - WEST COAST AND ALASKA TSUNAMI WARNING CENTER/NOAA/NWS
SUBJECT - TSUNAMI INFORMATION BULLETIN
BULLETIN NUMBER 1
ISSUED 07/24/2005 AT 1559 UTC

.THIS TSUNAMI INFORMATION BULLETIN IS FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON AND CALIFORNIA ONLY...

NO - REPEAT NO - WATCH OR WARNING IS IN EFFECT.

EARTHQUAKE DATA
PRELIMINARY MAGNITUDE - 7.2
LOCATION - 7.9N 92.1E - NICOBAR ISLANDS, INDIA
TIME - 0742 ADT 07/24/2005
0842 PDT 07/24/2005
1542 UTC 07/24/2005

EVALUATION
BASED ON LOCATION AND MAGNITUDE THE EARTHQUAKE WAS NOT SUFFICIENT TO GENERATE A TSUNAMI DAMAGING TO CALIFORNIA - OREGON - WASHINGTON - BRITISH COLUMBIA OR ALASKA. SOME AREAS MAY EXPERIENCE SMALL SEA LEVEL CHANGES. IN AREAS OF INTENSE SHAKING LOCALLY GENERATED TSUNAMIS CAN BE TRIGGERED BY SLUMPING.

THE PACIFIC TSUNAMI WARNING CENTER WILL ISSUE TSUNAMI BULLETINSFOR HAWAII AND OTHER AREAS OF THE PACIFIC. THIS WILL BE THE ONLY BULLETIN ISSUED FOR THIS EVENT BY THE WEST COAST AND ALASKA TSUNAMI WARNING CENTER UNLESS CONDITIONS WARRANT. REFER TO THE INTERNET SITE WCATWC.ARH.NOAA.GOV FOR MORE INFORMATION. ♦

INFREQUENTLY ASKED QUESTIONS

Compiled by Lee Walkling

Which scientists "predicted" the Sumatra earthquake/tsunami at a scientific meeting in December 2004?

Kerry Sieh, Catherine Stebbins, Danny H. Natawidjaja, and Bambang W. Suwargadi wrote the following abstract: "Mitigating the effects of large subduction-zone earthquakes in Western Sumatra," EOS, American Geophysical Union Transactions, v. 85, no. 47, p. F1289. Published November 2004

To read the full text of the abstract, go to page 12.

What record did the Sumatra earthquake set?

The quake set records for the longest fault rupture. Scientists estimate the quake caused 1,200 km (750 miles) of faultline to slip up to about 20 meters (65 feet). The unstable faultline has since triggered hundreds of strong quakes, including one of 8.7 magnitude in March [2005], and is likely to set off more large quakes, researchers say.

From: http://www.cnn.com/2005/WORLD/asiapcf/06/23/tsunami.june05factbox.reut/index.html

Are seiches more apt to happen close to an earthquake's epicenter or at a distance?

"In the majority of instances, earthquake-induced seiches do not occur close to the epicenter of a great shock but hundreds of miles away. This is due to the following factors: It is in the nature of the transmittal of earthquake shock waves that only those close to the epicenter consist of high-frequency vibrations, while those at much greater distances are of lower frequency. High-frequency waves often are of too short duration to induce seiche action. Low-frequency impulses, on the other hand, moving as slowly as 2 miles per second (as against about 5 miles per second for the others), have that lower velocity and higher persistence more likely to augment rhythmic movement in a body of water, sometimes to an amazing degree."

From: Myles, Douglas, 1985, The Great Waves: McGraw-Hill Book Company, p. 131-132.

Have you heard any Indian Ocean tsunami jokes?

Sadly, yes. These are the only three that were printable. (1) What's the least popular detergent in Indonesia? Answer: Tide. (2) Aren't the beachfront cities in Thailand without power? Answer: No, there's plenty of current running through the towns. (3) What did the photographer say, when about to photograph a group of tourists? Answer: "WAVE!" ♦

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