TsuInfo Alert

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

National Tsunami Hazard Mitigation Program

a state/federal partnership funded through the National Oceanic and Atmospheric Administration (NOAA)

Contents

Volume 7, Number 1, February 2005

USGS Earthquake Hazards Program report - Indian Ocean tsunami
http://earthquake.usgs.gov/recenteqsww/Quakes.usslav.htm

Magnitude 9.0 - Off the west coast of northern Sumatra
December 26, 2004, 00:58:53 (UTC)
Depth: 30 km (18.6 miles)
Distances:

250 km (155 miles) SSE of Banda Aceh
310 km (195 miles) W of Medan, Sumatra
1260 km (780 miles) SSW of Bangkok
1605 km (990 miles) NW of Jakarta, Java

Felt reports (abridged). The tsunami crossed into the Pacific Ocean and was recorded in New Zealand and along the west coast of South and North America.

December 26, 2004, Asian Tsunami

January 20, 2005. The new figure lifted the total global death toll from the tsunami disaster to 226,566, although the number continues to rise as more deaths are reported around the region.

At a memorial service held in Oslo on January 16th, Hilde F. Johnson, Minister of International Development, corrected a line from the Poetic Edda, which reads "Once you know your friend's sorrow, it becomes your own." He amended this with the observation that, "Our friend's sorrow is never quite our own. We can never relieve those left behind of their despair, no matter how much we wish we could. It is a burden that must be borne." (http://www.suite101.com/article.cfm/norwegian_culture/113400)

As Canadian Paul Martin said, "So many have experienced loss - this is a tragedy of a million griefs." (http://www.680news.com/news/national/article.jsp?content=n010823A)

We dedicate this issue to all the victims of the tsunami and the loved ones they left behind.

TsuInfo Alert

is prepared by the Washington State Department of Natural Resources
on behalf of the National Tsunami Hazard Mitigation Program,
a State/Federal Partnership funded through the National Oceanic and Atmospheric Administration (NOAA).

It is assembled by
Lee Walkling, Librarian,
and is published bi-monthly by the
Washington Department of Natural Resources, Division of Geology and Earth Resources.

This publication is free upon request and is available in print (by surface mail),
and at http://www.dnr.wa.gov/geology/tsuinfo/index.html.
Participants in the TsuInfo program can request copies of reports listed in this issue from:
Washington Geology Library
Washington Department of Natural Resources
Division of Geology and Earth Resources
1111 Washington Street SE, MS 47007
Olympia, WA 98504-7007
360/902-1473
fax: 360/902-1785
e-mail: lee.walkling@wadnr.gov

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Doug Sutherland - Commissioner of Public Lands

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

TSUNAMI INFORMATION BULLETINS FOR THE INDIAN OCEAN TSUNAMI

The Indian Ocean tsunami bulletins from the Pacific Tsunami Warning Center (Pacific and Hawaii bulletins) and the West Coast and Alaska Warning Center bulletins are available at http://wikisource.org/wiki/2004_Indian_Ocean_tsunami_bulletins Reprinted below are the Pacific bulletins only.

December 26, 2004 - 0114 UTC
TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 0114Z 26 DEC 2004

THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

THIS MESSAGE IS FOR INFORMATION ONLY. THERE IS NO TSUNAMI WARNING OR WATCH IN EFFECT.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS
ORIGIN TIME - 0059Z 26 DEC 2004
COORDINATES - 3.4 NORTH 95.7 EAST
LOCATION - OFF W COAST OF NORTHERN SUMATRA
MAGNITUDE - 8.0

EVALUATION:
THIS EARTHQUAKE IS LOCATED OUTSIDE THE PACIFIC. NO DESTRUCTIVE TSUNAMI THREAT EXISTS BASED ON HISTORICAL EARTHQUAKE AND TSUNAMI DATA. THIS WILL BE THE ONLY BULLETIN ISSUED FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE BULLETINS FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

December 26, 2004
TSUNAMI BULLETIN NUMBER 002
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 0204Z 26 DEC 2004

THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

ATTENTION: NOTE REVISED MAGNITUDE.

THIS MESSAGE IS FOR INFORMATION ONLY. THERE IS NO TSUNAMI WARNING OR WATCH IN EFFECT.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS:
ORIGIN TIME - 0059Z 26 DEC 2004
COORDINATES - 3.4 NORTH 95.7 EAST
LOCATION - OFF W COAST OF NORTHERN SUMATRA
MAGNITUDE - 8.5

EVALUATION:
REVISED MAGNITUDE BASED ON ANALYSIS OF MANTLE WAVES. THIS EARTHQUAKE IS LOCATED OUTSIDE THE PACIFIC. NO DESTRUCTIVE TSUNAMI THREAT EXISTS FOR THE PACIFIC BASIN BASED ON HISTORICAL EARTHQUAKE AND TSUNAMI DATA.

THERE IS THE POSSIBILITY OF A TSUNAMI NEAR THE EPICENTER.

THIS WILL BE THE ONLY BULLETIN ISSUED FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE BULLETINS FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

December 27, 2004
TSUNAMI BULLETIN NUMBER 003
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1535Z 27 DEC 2004

THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

THIS MESSAGE IS FOR INFORMATION ONLY. THERE IS NO TSUNAMI WARNING OR WATCH IN EFFECT.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS:
ORIGIN TIME - 0059Z 26 DEC 2004
COORDINATES - 3.4 NORTH 95.7 EAST
LOCATION - OFF W COAST OF NORTHERN SUMATRA
MAGNITUDE - 9.0

EVALUATION:
SOME ENERGY FROM YESTERDAYS TSUNAMI IN THE INDIAN OCEAN HAS LEAKED INTO THE PACIFIC BASIN... PROBABLY FROM SOUTH OF THE AUSTRALIAN CONTINENT. THIS ENERGY HAS PRODUCED MINOR SEA LEVEL FLUCTUATIONS AT MANY PLACES IN THE PACIFIC. FOR EXAMPLE...

50 CM CREST-TO-TROUGH AT CALLAO CHILE
19 CM CREST-TO-TROUGH AT IQUIQUE CHILE
13 CM CREST-TO-TROUGH AT PAGO PAGO AMERICAN SAMOA
11 CM CREST-TO-TROUGH AT SUVA FIJI
50 CM CREST-TO-TROUGH AT WAITANGI CHATHAM IS. NEW ZEALAND
65 CM CREST-TO-TROUGH AT JACKSON BAY NEW ZEALAND
18 CM CREST-TO-TROUGH AT PORT VILA VANUATU
06 CM CREST-TO-TROUGH AT HILO HAWAII USA
22 CM CREST-TO-TROUGH AT SAN DIEGO CALIFORNIA USA

HOWEVER... AT MANZANILLO MEXICO SEA LEVEL FLUCTUATIONS WERE AS MUCH AS 2.6 METERS CREST-TO-TROUGH PROBABLY DUE TO FOCUSING OF ENERGY BY THE EAST PACIFIC RISE AS WELL AS LOCAL RESONANCES.

THIS IS TO ADVISE THAT SMALL SEA LEVEL CHANGES COULD CONTINUE TO BE OBSERVED ACROSS THE PACIFIC OVER THE NEXT DAY OR TWO UNTIL ALL ENERGY FROM THIS EVENT IS EVENTUALLY DISSIPATED.

THIS WILL BE THE FINAL BULLETIN ISSUED FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE BULLETINS FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA. ♦

National Tsunami Hazard Mitigation Program Meeting minutes, November, 2-4, 2004 Oakland, California

Attendees: Jeff LaDouce – NOAA/NWS (Chair)
Sterling Yong – HI DLNR
Brian Yanagi – HI State Civil Defense
David Oppenheimer – USGS
Laura Kong – NOAA/ITIC
Jeff Lorens – NOAA/NWS WR
Michael Hornick – FEMA/DHS
Ervin Petty – Div. of HS&EM, AK R.
Vasily Titov – NOAA/PMEL
Charles McCreery – PTWC
Tim Walsh – WA – DNR
Leslie Chapman-Henderson – FLASH
George Priest – OR/DOGAMI
Frank González – NOAA/PMEL
Michael Mahoney – FEMA/DHS
Michael Reichle – CA Geological Survey
James Goltz – CA – OES
Don Hoirup, Jr. – CA Geological Survey
Richard Eisner - CA - OES
Kathleen O'Neil – NOAA/NDBC
Melinda Bailey – NOAA/NWS SR
Roger Hansen – Univ. of Alaska
Scott Simmons – Div. of HS&EM, AK
Craig Weaver – USGS
Paul Whitmore - WC/ATWC
George Crawford – WA – EMD
Jay Wilson – OR – EMD
Eddie Bernard – NOAA/PMEL
Harry Yeh – OR State Univ.
Jan Jones – NOAA/NWS – Recorder

Review of Action Items

Action Item 1: The USGS earthquake response plan and the NOAA response plan need to be examined to be sure that tsunami is included in both plans.
Status: Completed and continuing.

Action Item 2: Take the 14 program goals and formulate a new 5-year plan.
Status: Continuing – no action this period. Next 5-year review to be conducted in Summer 2006.

Action Item 3: Form a Technical Advisory Board.
Status: Completed.

Action Item 4: Provide names of presenters for future meetings, e.g., social scientists, local emergency managers and WCM's, national and local media, and researchers.

Status: Continuing and to be taken off action items list. Leslie Chapman-Henderson, President and CEO of the Federal Alliance for Safe Homes (FLASH), gave a presentation of FLASH card handouts that she provides to schools, businesses, etc. on how to prepare before, during and after a natural disaster.

Action Item 5: The group was asked for comments on the NDBC Draft DART Concept of Operation Document. Action: Kathleen O'Neil: Equator Buoy Information and redraft of operations plan – revised with final comments. Status: Completed.

Action Item 6: Explore issues and challenges of developing a concept called "Bridge for Disseminating Real Time Technical Assistance and Coordinating Community Protection."
Status: Continuing.

Action Item 7: The group was asked to provide, in writing, the Latitude and Longitude locations for the 7th and 8th DART buoys for NDBC.
Status: OPEN.
Action: Charles McCreery and Jeff LaDouce by end of November, beginning of December.

Action Item 8: CREW – Cascadia Region States Action: This item has been removed as it is considered an emergency management issue and will be coordinated at the regional level.

Action Item 9 Establish a Working Group driven by Emergency Management needs.
Status: The NTHMP Modeling and Mapping Working Group has been established. Completed.

Action Item 10: 5-Year Plan.
Status: Completed.

New Action Item: Rich Eisner to provide FEMA strategic plan. Eddie Bernard suggested getting an original plan for FY05 and have it be "evolutionary" with changes in formats, but not the plan.

New Action Item: Tsunami Awareness Week 2006. Sen. Inouye and Jeff LaDouce are to draft a proclamation to introduce Tsunami Awareness Week during Earthquake Awareness Month in April. This will coincide with the 60th Anniversary of the 1946 tsunami that struck Hawaii and the 100th Anniversary of the 1906 event.

Leslie Chapman Henderson from the Federal Alliance for Safe Homes (FLASH) Leslie gave a presentation with what FLASH has available to the public for disasters. The safety information packets are available at Home Depot & State Farm Insurance to name just two. The FLASH website had 2 ½ million hits during September alone. (www.flash.org) There will be a large FLASH meeting in Sarasota Florida, February 8-10, 2005. There is also a PBS special, Tsunami's and Earthquakes that will be shown on national television.

Harry Yeh – Oregon State University Harry gave a presentation showing a Tsunami Shelter in Nishiki Japan. With the reinforced concrete, masonry and wood frame it was a compilation of previous work completed, and resembled a lighthouse shape.

Melinda Bailey – Marine & Public Meteorologist - Texas To follow is the information on tide gage locations (which ones need to be upgraded to include real time observations and locations of new ones) in the Puerto Rico area. Here is what we found out: New Ones: Mona Island, Facilities of the Park Rangers of the PR Dept. of Natural Resources (67.94 W and 18.08 N). Aguadilla, Pier, (67.17 W, 18.46 W) Culebra, Pier of Ports Authority (65.30 W, 18.30 N). Vieques, Esperanza, (65.47W, 18.09 N). (All these locations would be subject to the approval of the operators of the facilities).

NOAA has tide gages at the following localities, these all make 6-minute observations: Magueyes, Parguera, 17.97N, 67.05W Guayanilla (66.16 W, 17.98 N) La Puntilla (San Juan Bay), 18.45N, 66.12 W Lime Tree Bay, St. Croix, 17.70N, 64.75W Charlotte Amalie, St. Thomas, 18.34N, 64.92W.

Paul Whitmore – West Coast/Alaska Tsunami Warning Center BC Tide Gage Equipment: The GOES transmitter equipment funded by the NTHMP with FY2003 funds has been procured and received at the WC/ATWC. We are now drafting a Memorandum of Agreement (MOA) between the NWS and the Canadian Hydrographic Survey (CHS). The CHS is also drafting a Partnership Agreement concerning this project. When the MOA is signed is signed by both parties, WC/ATWC will send all equipment to CHS for installation in the summer of 2005.
To follow-up on Thursday's session, attached are three example WC/ATWC tsunami warning messages which contain Evaluations Sections stating:
WarningMessage1.txt - no major inundation expected but potential significant impact near shore,
WarningMessage2.txt - major inundation possible, and
WarningMessageU.txt - inundation level can not be estimated.
Instead of breaking warnings down into different levels as was proposed at the May meeting, these samples continue the present warning/watch/info only structure of tsunami warnings. The only changes proposed are in the evaluation section (the wording was determined by a team appointed at the March TCM meeting). These three samples would be issued after a tsunami has been recorded and the tsunami warning centers have had a chance to determine the impact potential of an event.

Please let me know within the next two weeks if you see any problems in using these Evaluations as opposed to the present message format which provides no information on the potential impact. Keep in mind these are NWS products and must follow a fairly rigorous structure (which is why everything is in capital letters and certain punctuation cannot be used).

[**Ed. note**: to see full text of the attached Warning Messages, go to http://www.pmel.noaa.gov/tsunami-hazard/Nov04NTHMPMeeting.pdf.]

Frank González – Completion of Action Item: Mapping and Modeling Working Group Frank González, Director, TIME Center, distributed and presented overviews of the "TIME Center Report: FY2004 Progress and FY2005 Plans" and the "Tsunami Forecasting System: FY2004 Progress and FY2005 Plans" report.

Dr. González also reported on the first meeting of the NTHMP Modeling and Mapping Subcommittee (MMS), held on November 2, 2004. Four recommendations were developed at that meeting that address the establishment of Standards and Procedures for identification of NTHMP-approved tsunami models. Dr. González presented these four recommendations for approval and adoption by the NTHMP Steering Group. After some discussion, Recommendation 2 was modified–the original phrase "Peer-reviewed Journal Articles" was replaced by the phrase "Peer-reviewed Publications." The Steering Group then approved and adopted the modified MMS Recommendations, worded as follows, with clarifying phrases added in brackets.

Recommendations Approved and Adopted by the NTHMP Steering Group:

1. That Standards and Procedures be developed for NTHMP Tsunami Model Approval.
2. That the basis for Tsunami Model Approval Standards and Procedures be Peer-reviewed Publications [that document issues such as]
- Methodology (Hydrodynamics, Numerical Scheme, etc.)
- Benchmark tests (Analytic, Laboratory, Field obs, etc.)
- Case Studies (Okushiri, Nicaragua, Flores, PNG, etc.)
3. That the MMS, in consultation with community experts, develop Guidelines on Standards and Procedures [including, for example]
- Standards: Content of documentation; metrics …
- Procedures: Database of case studies; approval …
4. That NTHMP funding be provided for travel expenses of experts assisting the MMS.

Discussions at the May 18, 2004 NTHMP Steering Group meeting in Anchorage resulted in an Action Item to establish a working group driven by Emergency Management need, that will develop recommendations on technical and policy issues related to NTHMP mapping and modeling efforts.

In accordance with this Action Item, the NTHMP Modeling and Mapping Working Group (MMWG) is now established. E-mail and telephone discussions with the State members of the Steering Group have produced unanimous agreement on the following:

1. (MMWG) Statement of Purpose "The responsibility of the NTHMP Modeling and Mapping Working Group is to develop scientific, technical and policy recommenddations for the NTHMP Steering Group that are based on the best available science.
2. MMWG Organizational Structure:

- current State Emergency Management official on the Steering Group,
- current State Geotechnical official on the Steering Group,
- current Director of the TIME Center.

Consequently, the corresponding, current MMWG membership is: Alaska: Scott Simmons and Roger Hansen; California: Richard Eisner and Mike Reichle; Hawaii: Brian Yanagi and Sterling Yong; Oregon: George Priest and Jay Wilson; Washington: George Crawford and Tim Walsh; TIME Center: Frank González.

Our immediate task is to develop a prioritized list of issues. There are many such issues, including: model certification, data acquisition, standards and quality control, probabilistic methodologies, etc. We will collate, organize and refine suggested issues to produce a prioritized list that we can begin to address in a systematic manner.

Kathleen O'Neil NDBC DART Status NOAA National Data Buoy Center operates and maintains the 6-station Deep-Ocean Assessment and Reporting of Tsunamis (DART) network. The presentation made at the November 2004 NTHMP meeting included operational status of the network, FY04 challenges and successes, and FY05 plans.

Aurelio Mercado – University of Puerto Rico Professor Mercado gave a presentation that included tsunami flood maps with hurricanes rated 1-5, indicated with tsunami storm surge. He said these are useful for education and outreach workshops in schools including having a drill. He also said he has tsunami hazard sign visibility, a website, and Spanish tsunami video.

The next NTHMP Steering Group meeting will be held at the National Weather Service Western Regional Headquarters, Pacific Guardian Center, Honolulu, Hawaii, June 7-9, 2005. A tour of the Pacific Tsunami Warning Center will also take place. Hotel information will be provided approximately 6 weeks prior to the meeting. Meeting contact is Jan Jones NOAA/NWS (jan.jones@noaa.gov). ♦

from: http://www.pmel.noaa.gov/tsunami-hazard/Nov04NTHMPMeeting.pdf.

NTHMP Modeling and Mapping Subcommittee Meeting Minutes
2 November 2004, 1–5 pm
California State Office Building, Room 12
1300 Clay Street, Oakland, California

Attendees: Eddie Bernard, George Crawford, Richard Eisner, Eric Geist, Frank González, Roger Hansen, Don Hoirup, Chris Jonientz-Trisler, Juan Pestana, George Priest, Michael Reichle, Scott Simmons, Costas Synolakis, Vasily Titov, Tim Walsh, Jay Wilson, Brian Yanagi, Sterling Yong

Prior to this first meeting of the subcommittee, González distributed an agenda and a summary of issues previously discussed by e-mail and telephone. The meeting addressed three main topics: Subcommittee Organization and Structure; Tsunami Model Certification; Source Modeling and Source Probabilities.

Subcommittee Organization and Structure. After considerable discussion, consensus was reached on several agenda issues:
1. MMS decision-making and the development of recommendations to the Steering Group will emphasize consensus. Dissenting opinions will be documented, and dissenters may choose to submit a dissenting report to the MMS and Steering Group.
2. Emergency Manager membership on the MMS is unnecessary
3. Expansion of the membership to include a USGS and NSF member is not desirable.
4. The TIME Center Director will serve as MMS chair.

Consensus was thereby reached on the following organization and structure of the MMS. NTHMP Modeling and Mapping Subcommittee
• Statement of Purpose
"The responsibility of the NTHMP Modeling and Mapping Subcommittee is to develop scientific, technical and policy recommendations for the NTHMP Steering Group that are based on the best available science."
• Organizational Structure
- current State Geotechnical official on the Steering Group
- current TIME Center Director (Chairperson)
• Decision-making
- Consensus; dissenting reports
- Invited experts to assist, as needed

As a consequence, the current MMS members are
• Current MMS Membership
- Alaska: Roger Hansen
- California: Michael Reichle
- Hawaii: Sterling Yong
- Oregon: George Priest
- Washington: Tim Walsh
- TIME Center: Frank González (Chairperson)

The committee next addressed two modeling and mapping issues, with the help of invited experts.

Tsunami Model Certification. Invited experts Costas Synolakis (USC) and Vasily Titov (UW/JISAO/TIME Center) presented a review of tsunami hydrodynamic modeling from the point of view of establishing standards and procedures for the identification of NTHMP-approved tsunami models for use in developing NTHMP products and capabilities.

Synolakis presented a history of hydrodynamic modeling of tsunamis, with an emphasis on descriptions of the earlier benchmark tests and validation exercises. He pointed out that there have been several workshops that focused on such activities, with modelers invited to test their individual models against the same benchmark tests and actual event data, such as the 1992 Okushiri tsunami, and that publications are available that document these results. Titov provided actual examples and results of such tests for the MOST model, used by USC and the TIME Center to produce model-based NTHMP products and forecast capabilities for California, Washington, and the NOAA Tsunami Warning Centers. Titov also emphasized that standards should probably be somewhat different for the two primary NTHMP applications --inundation maps, and real-time forecasting. This is because each application should require different priorities and tradeoffs between such factors as speed, accuracy and robustness.

Discussion and Recommendations
González presented three draft recommendations to the NTHMP Steering Group were presented for discussion and approval, in the form of a PowerPoint slide:
==========
Tsunami Model Certification: Strawman Recommendation(s)
(*Philosophy: Document Scientific Process; Avoid Conflicts of Interest)*
1. That Standards and Procedures be developed for NTHMP Tsunami Model Certification
2. That Peer-reviewed Journal Articles form the basis for Certification Standards and Procedures
- *Methodology (Hydrodynamics, Numerical Scheme, etc.)*
- *Benchmark tests (Analytic, Laboratory, Field obs, etc.)*
- *Case Studies (Okushiri, Nicaragua, Flores, PNG, etc.)*
3. That Guidelines on Certification Standards and Procedures be developed by the MMS, in consultation with community experts
- *Standards: Content of documentation; metrics …*
- *Procedures: Database of case studies; approval …*
- *Priority: Request documentation on existing NTHMP models*
==========

Discussion included all present–MMS members, invited experts, and guests–and was wide-ranging, covering scientific, technical and policy issues. Consensus was reached on a change of the word "Certification" to "Approval," primarily because of concerns regarding legal issues and liabilities that might be implied. Roger Hansen raised an objection to the phrase "Peer-reviewed Journal Articles," suggesting that this phrase be replaced by "Peer-reviewed Publications." A substantial discussion of this issue then ensued, with the result that 5 of the 6 MMS members agreed to retain the phrase "Peer-reviewed Journal Articles," with Roger Hansen dissenting. As agreed above, Hansen's dissent and his option to submit a dissenting report to the MMS and Steering Group is documented here. González created a revised PowerPoint slide to reflect the one-word changes agreed upon, and the final version of the MMS recommendations to the NTHMP Steering Group for establishing standards and procedures for the identification of NTHMP-approved tsunami models follows.

==========

Tsunami Model Approval
1. That Standards and Procedures be developed for NTHMP Tsunami Model Approval
2. That Peer-reviewed Journal Articles form the basis for Approval Standards and Procedures
- *Methodology (Hydrodynamics, Numerical Scheme, etc.)*
- *Benchmark tests (Analytic, Laboratory, Field obs, etc.)*
- *Case Studies (Okushiri, Nicaragua, Flores, PNG, etc.)*
3. That Guidelines on Approval Standards and Procedures be developed by the MMS, in consultation with community experts.
- *Standards: Content of documentation; metrics …*
- *Procedures: Database of case studies; approval …*
- *Request documentation on existing models*

==========

In addition, the following Action Item was assigned:
Action Item. González will develop an inventory and report on the existing documentation of tsunami models currently being used to develop NTHMP products.
Source Modeling and Source Probabilities. Invited expert Eric Geist (USGS) presented two topics to the Mapping and Modeling Subcommittee: (1) dealing with complexities and uncertainties associated with tsunami sources and (2) development of probabilistic tsunami hazard analysis (PTHA) in association with the ongoing FEMA pilot study at Seaside, Oregon.

For the first topic, it was indicated that reliance on historic sources might not take into account event-to event variations in source parameters that may occur. Using historic earthquakes as the maximum credible source, for example, implicitly assumes a characteristic earthquake rupture model. Analysis of historic seismicity indicates, however, that many faults behave non-characteristically. The challenge then is to reconcile non-characteristic behavior with specification of maximum credible sources and how to accommodate the associated uncertainty of non-characteristic sources into tsunami inundation maps.

A review of PTHA was also presented with particular reference to similar efforts in the seismic hazard mapping community. The two primary ways that PTHA differs from Probabilistic Seismic Hazard Analysis (PSHA) is that PTHA needs to include far-field sources into the analysis and that numerical propagation models can be effectively used in PTHA. The latter is a distinct technological advantage in comparison to PSHA which relies on empirical attenuation relationships (and associated uncertainty) linking the source and the site hazard. Overall, probabilistic analysis gives an additional dimension–likelihood of hazard occurring–with which emergency managers and land-use planners can make informed decisions.
Discussion. One issue discussed was the possible establishment of standards and procedures to identify NTHMP-approved seismic source models, in parallel with the tsunami model recommendations, above. Geist suggested that there is an abundance of seismic model documenttation in the form of peer-reviewed journal articles. With time short, all agreed that this issue must be further investigated and resolved, as a high-priority MMS item.

APPENDIX
Pre-meeting material distributed by e-mail on 20 October 2004:
Background; Agenda; Technical Issues. Modeling and Mapping Subcommittee Meeting
2 November 2004, California Governor's Office of Emergency Services, Coastal Region, Oakland, California
Background; The following is based on e-mail discussions conducted 15 July to 7 September, 2004.
Organizational Items
Agreement was reached on the Statement of Purpose, Organizational Structure and, thus, the Current Membership:
• Statement of Purpose:
"The responsibility of the NTHMP Modeling and Mapping Subcommittee is to develop scientific, technical and policy recommendations for the NTHMP Steering Group that are based on the best available science."
• Organizational Structure:
- current State Emergency Management official on the Steering Group,
- current State Geotechnical official on the Steering Group,
- current Director of the TIME Center
• Current Membership:
Alaska: Scott Simmons and Roger Hansen
California: Richard Eisner and Michael Reichle
Hawaii: Brian Yanagi and Sterling Yong
Oregon: George Priest and Jay Wilson
Washington: George Crawford and Tim Walsh
TIME Center: Frank González

Disagreements on two items are currently unresolved:
• Voting Structure
• Membership Expansion

Technical Issues. Attachment A lists technical issues identified by subcommittee members, so far. These have been loosely annotated with relevant sub-issues, and organized into two broad categories: (1) Standards and Quality Assurance and (2) Technology Improvement.

Meeting Agenda
2 November 2004
California Governor's Office of Emergency Services, Coastal Region, Oakland, California

13:00 ***Unresolved Organizational Items.*** E-mail discussion left the following questions unresolved:
Voting.
- Shall State votes be cast only by the State Emergency Management official (1 vote per State), or shall the State Geotechnical official also vote (2 votes per State) ?
- Shall the TIME Director cast a vote on all issues, or vote only to break a tie ?
- Shall the voting privilege be transferable to an Alternate ? If so, may an Alternate cast more than one vote ?

Membership Expansion. E-mail discussions produced the following proposals:
PROPOSAL 1. Add a USGS Steering Group representative.
PROPOSAL 2. Add an NSF Steering Group representative.

Chairperson. Not discussed, but should be resolved.
- Current TIME Director serves as chairperson ?
- Rotate chair among current State officials ?
- Other … ?

13:30 ***Technical Issue:*** Tsunami Model Certification
Invited expert: Costas Synolakis, USC. The goal of this discussion will be to develop, if possible, a recommendation to the Steering Group regarding the establishment of NTHMP Tsunami Model Certification procedures.

15:00 ***Technical Issue:*** Source Modeling and Source Probabilities
Invited expert: Eric Geist, USGS. The goal of this discussion will be to develop, if possible, a recommendation to the Steering Group regarding source modeling.

16:30 ***Summary and wrap-up***

17:00 ***Adjourn***

Attachment A. Technical Issues.

Category 1. *Standards and Quality Assurance*
- Model Certification (Tsunami and Source)
Benchmark tests (Analytic, Field data, Lab data, …)
Documentation
Peer Review
- Grid Quality Assessment
Bathy/topo data quality and density
Datum and other errors
Adequate resolution
- Minimum Source Probability
X % Probability of Occurrence in Y year
- Content of Map and Accompanying Text
Source Discussion
Modeling Discussion
Uncertainties (Using, e.g., multiple source runs, degraded grids, other methodologies ?)
General Advice on Use
Graphic & Digital Products – Max depth, ETA, time histories, etc.
- Map Quality Rating System
Grid Quality
Source Knowledge
Other …
- Map Review Process
TIME Center
Outside review panel
Both
- Publication Standards
Format
Responsible State Agency

Category 2. *Technology Improvements*
- Bathy/Topo Data Acquisition
- Source Models
Geophysical sources
Design sources
- Probabilistic Methodologies
- Evacuation Models ♦
from: http://www.pmel.noaa.gov/tsunami-hazard/20041102MMS.pdf

TsuInfo Alert has not been licensed to include the article about a tsunami in Virginia in the online edition. The article can be found at www.timesdispatch.com/servlet/Satellite?pagename=RTD/MGArticle/RTD_BasicArticle&c=MGArticle&cid=1031779973304

Washington Prepares for Tsunamis and Other Geologic Hazards

by Ron Teissere, Washington State Geologist

The coast of Washington is at risk from large submarine earthquakes that can cause tsunamis such as those recently seen in Indonesia.

Tsunamis are generated when geologic events cause large, rapid movements in the sea floor that displace the water column above. That swift change creates a series of high-energy waves that radiate outward like pond ripples. Tsunamis can strike the adjacent shorelines within minutes and also cross the ocean at speeds as great as 600 miles per hour to strike distant shores. For example, the tsunamis in the Indian Ocean caused by the 9.0 earthquake in Indonesia reached Sumatra's and SE Asia southeast shores in minutes while other waves reached Indian and African shores hours later because of the distance.

The Department of Natural Resources in cooperation with Washington Military Department, Emergency Management Division has taken a leadership role in helping Washington prepare for tsunamis by researching and developing tsunami inundation and evacuation maps and participating in the location of warning buoys located off the coast of the Northwest, Alaska, and South American coasts. Most of the tsunami inundation maps for areas in Washington are available in PDF format for downloading at http://www.dnr.wa.gov/geology/pubs/pubs_ol.htm#hazards. The inundation map for the southwestern coast of Washington (GM-49) is available in printed format from the Department of Printing General Store at http://www.prt.wa.gov/.

The Department of Natural Resources also prepares and publishes ***TsuInfo Alert*** , a newsletter distributed world wide on behalf of the National Tsunami Hazard Mitigation Program. It is made possible by a grant from the National Oceanic and Atmospheric Administration via the National Weather Service. Current and back issues of ***TsuInfo Alert*** are available at http://www.dnr.wa.gov/geology/tsuinfo/.

Washington is one of the most hazardous places to live in the world and continuous preparation and constant vigilance are necessary. We live at an active plate boundary where the oceanic plate is sliding beneath the North American continental plate. The energy built up in this process creates the potential for earthquakes, tsunamis, and volcanoes. The steep terrain of our state is a result of this active geologic boundary.

The cooperation of the geologists at the Department of Natural Resources with federal, state, and local agencies has made Washington better prepared for tsunamis than places like Indonesia, India, and Africa. However, as was noted in the December 31, 2004, edition of the Wall Street Journal on page W6, seismology and related studies remain one of the most under-funded areas of scientific endeavor. The need for more complete information and better products for scientists, emergency managers, building officials, and the public cannot be met without proper funding. The Department of Natural Resources has a long history of providing the maps, geologic explanations, and public information products preparing us for earthquakes, landslides, and volcanoes. Budget reductions in recent years have reduced the work being done on geologic hazards. Funding proposals for the 05-07 Biennium have been made by the Department of Natural Resources to continue this important work.

For more information, contact Ron Teissere, State Geologist, at the Division of Geology and Earth Resources, by telephone at 360.902.1440, or e-mail at ron.teissere@wadnr.gov. ♦

NEWS

World Conference on Disaster Reduction

Kobe, Japan, 18-22 January 2005. More than 3000 governmental officials, non-governmental experts and other specialists met at the U.N.-sponsored conference to discuss disaster reduction in the wake of the devasting Asian tsunami.

An agreement was reached concerning an Indian Ocean warning system, now the responsibility of the U.N. Intergovernmental Oceanographic Commission. The system, at an estimated cost of $30 million, will be-come functional in 12–18 months. A global warning system should be in place by 2007. France, Germany, Japan, Australia, China, U.S., India, Thailand, and Indonesia have all pledged support for developing the warning systems.

Ben Wisner, a professor of development at the London School of Economics, was optimistic, saying the tsunami-hit countries had shown they were committed. "The power struggle over this and the politics of big science may still have aftershocks and further developments," he said. "But I don't think it would be very hard to pull this together."

He said, however, that in a warning system, "about 10 percent rests with the hardware and 90 percent is institutional and cultural and economic— how can you get these messages out to the people who actually need to do something?"

"People may have cell phones in villages but no money to buy a prepaid card. They have a transistor radio but no money to buy the battery for it. The devil is in the details," he said. (Ben Wisner quoted from http://dsc.discovery.com/news/afp/20050124/tsunamisystem.html)

For full text of the conference documents, go to http://www.unisdr.org/wcdr/.

New Study Suggests Kids Could Use More Disaster Training

Preliminary results from an American Red Cross study suggest that students show no increase in disaster knowledge after the fifth grade. Researchers found that while kindergarteners through fifth graders showed an increase in disaster knowledge every year until the fifth grade, after the fifth grade, disaster knowledge actually appeared to decrease as did the students' overall ability to react to disaster situations.

These findings are from the School Safety Initiative (SSI), the prototype for the Together We Prepare program, which helps schools prevent, prepare for, and respond to violent incidents, natural disasters, and other emergencies. The SSI study analyzes data from elementary, middle, and high schools in eight cities. More than 10,000 students in kindergarten through twelfth grade, their teachers, and school staff participated in the first phase of the study. Their knowledge, behavior, and attitudes in regard to first aid, safety, disaster knowledge and preparedness, and leadership were surveyed.

Phase two of the study will evaluate the effect of Red Cross resources, which are currently in schools around the country. Resources like Masters of Disaster, a kit of ready-to-go lesson plans, activities, and demonstrations of hazard-related lifesaving information, are designed for flexibility to allow for integration into the core academic subjects. Supplements to Masters of Disaster include Facing Fear, developed after 9/11 to address a demand by educators and caregivers for materials to help children cope in uncertain times.

For more information on American Red Cross preparedness and safety resources for kids, visit http://www.redcross.org/services/disaster/0,1082,0_503_,00.html or contact them at 2025 E Street NW, Washington, DC 20006; http://www.redcross.org/.
from: Natural Hazards Observer, v. 29, no. 3, p. 4

ICC and IBHS Join to Improve Disaster-Related Building Codes

The International Code Council (ICC) and the Institute for Business and Home Safety (IBHS) have signed a strategic alliance agreement to work together on the research, development, adoption, and enforcement of building codes that address disaster-resistant residential and commercial construction. One of the first collaborative efforts will be the analysis of construction performance in Florida following this year's active hurricane season to determine the effectiveness of the state's building codes in high wind events. The Federal Emergency Management Agency and the Florida Department of Community Affairs will also participate in this process. Upon completion of the analysis, a summit meeting of public and private sector representatives will be held to begin developing plans to strengthen existing codes and standards.

More information is available through the ICC, 5203 Leesburg Pike, Suite 600, Falls Church, VA 22041; (703) 931-4533; http://www.iccsafe.org/ or the IBHS, 4775 East Fowler Avenue, Tampa, FL 33617; (813) 286-3400; e-mail: info@ibhs.org; http://www.ibhs.org/.
from: Natural Hazards Observer, v. 29, no. 3, p. 23

Status report: Pacific Ocean tsunami buoys

Recent newspaper articles have reported that half of the six tsunami detection buoys in the Pacific Ocean are broken….two off Alaska and one off Washington's coast. The latter is in the process of being repaired.

An AP article (News Tribune, Jan. 14, 2005) quoted Paul Whitmore, chief scientist for the West Coast and Alaska Tsunami Warning Center, "We are still a fully functional warning system, even without the buoys…The impact of those buoys being out is that we have less data upon which to cancel or expand warnings."

The old network of 125 tide gauges widely spaced from Alaska to California, coupled with seismographs, detects and measures earthquakes. If there was a large earthquake, coastal people were evacuated, often in regions that never saw any tsunami run-up. The buoys help calculate the direction a tsunami is going and the size it could be when it hits the shore. This more precise data reduces the number of false alarms.

According to a January 14, 2005, article (AP, News Tribune), the ideal warning system for the Pacific Ocean would include 21 buoys, each costing $250,000 to build and thousands to maintain. Sen. Dianne Feinstein (D-Calif.), Sen. Joe Lieberman (D-Conn.), U.S. Rep. Jay Inslee (D-Bainbridge Island), have introduced legislation concerning tsunami warning systems.

PUBLICATIONS

Small threat, but warning sounded for tsunami research

by Phil Cummins
http://www.ga.gov.au/image_cache/GA5059.pdf

This article was published in the September 2004 issue of *AUSGEO News 75* (p. 4-7). The sidebar accompanying the article says "Mention 'tsunami' and fear washes through coastal settlements in many southern Pacific islands. Australia rarely thinks about tsunamis, yet it has an enormous mainland coastline that is rapidly being populated.

There is an international tsunami warning system for the Pacific Ocean, but none for the Indian Ocean. How vulnerable is Australia to the risk of tsunami, and are we leaving our western coastal communities exposed?

Geoscience Australia has been modeling open-ocean propagation of earthquake-related tsunamis that may affect our western coastline."

The full text of the article is available online at the URL given above. It discusses seismicity in the Sunda Arc and mentions the 1833 tsunami in the Indian Ocean, which is one of the tsunamis that Geoscience Australia has modeled.

Risk Analysis for Extreme Events: Economic Incentives for Reducing Future Losses

Howard Kunreuther, Robert Meyer, and Christophe Van den Bulte. NIST GCR 04-871. 2004. 103 pp. Free. Available online from the National Institute of Standards and Technology, Office of Applied Economics, 100 Bureau Drive, Stop 8603, Gaithersburg, MD 20899; fax: (301) 975-5337; http://www.bfrl.nist.gov/oae/publications/gcrs/04871.pdf.

This report discusses the need for linking risk assessment, risk perception, and risk management in order to develop meaningful strategies for dealing with extreme events (i.e., low probability–high consequence events). Cases where extreme events exhibit interdependencies, either among individual stakeholders or among stakeholder groups, are given special attention. Special attention is also given to the need for cooperation between the public and private sectors with the ultimate goal of generating sound strategies for reducing the risks of extreme events and reducing the damage should such catastrophes occur.

from: Natural Hazards Observer, v. 29, no. 3, p. 20

2004 NEMA Biennial Report: Organizations, Operations, and Funding for State Emergency Management and Homeland Security

ISBN 0-87292-820-9. 2004. 55 pp. $35.00. Available from the National Emergency Management Association, PO Box 11910, Lexington, KY 40578; (859) 244-8000; http://www.nemaweb.org/.

As part of a continuing effort by the National Emergency Management Association (NEMA) to promote greater recognition of the states' commitment to emergency management, public safety, and homeland security, this report examines funding, spending, organizational, and operational issues for state-level emergency management during fiscal year 2003. It discusses how, in this new era of disaster management, states are adjusting to the need to balance their new homeland security responsibilities with the ongoing threat of natural disasters in a system of all-hazards preparedness.

from: Natural Hazards Observer, v. 29, no. 3, p. 20

Natural Disasters

Patrick L. Abbott. Fourth Edition. ISBN 0-07-292198-6. 2004. 480 pp. $84.06. Available from the McGraw-Hill Companies, Order Services, PO Box 182604, Columbus, OH 43272; (877) 833-5524; e-mail: pbg.ecommerce_custserv@mcgraw-hill.com; http://books.mcgraw-hill.com/.

As evidenced by its title, this textbook focuses on natural disasters. Particular attention is paid to the themes of energy sources underlying disasters; plate tectonics and climate change; earth processes operating in rock, water, and atmosphere; significance of geologic time; and the complexities of multiple variables operating simultaneously. Supplemental materials are available for both students and instructors.

from: Natural Hazards Observer, v. 29, no. 3, p. 20

Disaster Resources Handbook on CD ROM

University of Missouri Extension is proud to announce the availability of the Disaster Resources Handbook on CD ROM. This compilation of disaster resources has taken months of searching and reviewing to compile. Thousands have already been distributed across the country. The cost for the development of this CD was paid for by a grant from the USDA in collaboration with the Extension Disaster Education Network (EDEN). This is one of the most comprehensive collections of its type. Find out more at: http://pizzazzemail.com/t?ctl=B0C66A:22EED3E

from: CONTINUITY e-GUIDE, January 19, 2005

WEBSITES

Animation of Sumatra earthquake and tsunami
http://staff.aist.go.jp/kenji.satake/animation.gif

Satellite images show tsunami destruction of Lhoknga, Indonesia
http://www.spaceref.com/news/viewsr.html?pid=14963 (Goddard Space Flight Center)

http://repositories.cdlib.org/sio/library/5/Southern/ Northern California Coastal Processes Annotated Bibliography: Coast of California Storm and Tidal Waves Study. 1985, 1987, reprinted 2003. 797 pages, pdf file.

ABSTRACT:

The California Coastal Processes Bibliography comprises 2,355 references to scientific literature & technical reports on the California coast: coastal processes, geology and geomorphology, hydrology and hydraulics, and meteorology. Compiled by the Los Angeles & San Francisco Districts of the Army Corps of Engineers, this Bibliography was published as part of the landmark Coast of California Storm and Tidal Waves Study (CCSTWS) and corresponds to the following publications: Southern California coastal processes : annotated bibliography : the coast of California storm and tidal waves study. Los Angeles. : US Army Corps of Engineers, Los Angeles District, Planning Division, Coastal Resources Branch, 1985. CCSTWS ; 85-4. Coast of California storm and tidal waves study 85-4. Northern California coastal processes annotated bibliography : Coast of California

storm and tidal waves study / prepared by U.S. Army Corps of Engineers, San Francisco District, Planning/ Engineering Division, Water Resources Branch. Los Angeles : US Army Corps of Engineers, Los Angeles District, Planning Division, Coastal Resources Branch, 1987. CCSTWS 87-5. Coast of California storm and tidal waves study 87-5.

http://www.unisdr.org/ppew/

The United Nations/International Strategy for Disaster Reduction's Platform for the Promotion of Early Warning aims to help the development of early warning and preparedness systems by advocating for better early warning systems. Visit this new Web site, the start of a growing information resource on early warning systems, and sign up for their quarterly newsletter.

from: Natural Hazards Observer, v. 29, no. 3, p. 16

http://www.udel.edu/DRC/drc40conference/

The Disaster Research Center has established this Web site featuring results from its spring 2004 conference Disaster Research in the Social Sciences: Lessons Learned, Challenges, and Future Trajectories.

from: Natural Hazards Observer, v. 29, no. 3, p. 16

http://www.operationhope.org/documents/EmergencyFinancialFirstAidKit.pdf

Operation Hope offers a free Emergency Financial First Aid Kit on its Web site. Designed to help Americans minimize the financial impact of a natural disaster or national emergency, this tool helps users identify and organize key financial records and serves as a quick reference to important financial documents. A Spanish version is under development.

from: Natural Hazards Observer, v. 29, no. 3, p. 16

http://www.domesticpreparedness.com/

Integrating the professional first responder communities of fire, law enforcement, emergency medical, National Guard, and local, state, and federal governments with industry concerned with domestic preparedness is the aim of this site, which features news about grants, government, industry, people, reports, events, and more.

from: Natural Hazards Observer, v. 29, no. 3, p. 16

http://www.csc.noaa.gov/noaaorgchart4czm/

This National Oceanic and Atmospheric Administration (NOAA) Organizational Chart for Coastal Managers was developed for coastal managers and staff to facilitate their understanding of the organizational structure, role, and responsibilities of NOAA offices involved in coastal management activities, such as weather, research, and fisheries management. Hard copies can be obtained by e-mailing clearinghouse@csc.noaa.gov.

from: Natural Hazards Observer, v. 29, no. 3, p. 17

http://science.nsta.org/nstaexpress/nstaexpress_2004_01_10_tsunami.htm

NSTA—and Science Teachers From Across the Globe—Recommend Tsunami Resources for the Classroom. *Note: The resources listed below were provided to NSTA by science educators who responded to a survey in* NSTA Express*. We've*[NSTA] *attempted to highlight the most popular resources, those that provide rich content material for teachers, and/or those that provide information free of charge. NSTA is not responsible for the content of these websites.*

CONFERENCES/SYMPOSIA

March 2–4, 2005

A Conference on America's Beaches: Current Issues in Beach Management, Tourism, and the Coastal Environment**.** Sponsor: International Hurricane Research Center (HRC)**.** Miami, Florida. This conference will focus on overlapping contemporary social and scientific issues facing beach managers. Topics include beach management and tourism, beach management in the face of coastal disasters, and beach management and the environment. For more information, contact the HRC, Florida International University, University Park Campus, MARC 360, Miami, FL 33199; (305) 348-1339; e-mail: defraene@fiu.edu; http://www.ihrc.fiu.edu/.

from: Natural Hazards Observer, v. 29, no. 3, p. 13

March 21–23, 2005.

The First International Symposium on Geoinformation for Disaster Management**.** Sponsors: Intergraph, Bentley Education Network, ESRI. Delft, The Netherlands. This symposium will focus on the response and relief phases of disaster management, encouraging discussion on systems and requirements for use of geoinformation under time and stress constraints and unfamiliar situations, environments, and circumstances. It will address these challenges by bringing together technology developers, disaster managers, information providers, developers of standards, and users. For more information, contact Elfriede M. Fendel, PO Box 5030 2600 GA, Delft, The Netherlands; +31152784548; e-mail: e.fendel@otb.tudelft.nl; http://www.gdmc.nl/gi4dm/.

from: Natural Hazards Observer, v. 29, no. 3, p. 13

April 13–15, 2005

Coastal Engineering 2005. Organizers: Wessex Institute of Technology, University of Coimbra. Algarve, Portugal**.** Scientists and engineers involved in the study and use of computational methods for coastal engineering problems are invited to attend this conference, which will address the study of seas and coastal regions under normal and extreme conditions, emphasizing the practical applications. Discussions will also take place on environmental problems of coastal areas, which are frequently densely

populated or sites of industrial development. Abstracts are due as soon as possible. For more information, contact Rachel Green, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO407AA, UK; +44 (0) 238 029 3223; e-mail: rgreen@wessex.ac.uk; http://www.wessex.ac.uk/conferences/2005/coastal2005/.

from: Natural Hazards Observer, v. 29, no. 3, p. 13

April 24–29, 2005

European Geosciences Society General Assembly 2005, Vienna, Austria. Will include a Natural Hazards Program, with a sessions NH 11.01 on "Modelling, computer-assisted simulations and mapping of natural phenomena for hazard assessment."

For details on the EGU Meeting: http://www.copernicus.org/EGU/ga/egu05/programme_overview.html

Event information:
Slope movements, lavas and pyroclastic flows, floods, soil erosion, earthquakes, tsunamis, pollution, fires, and spread of infection, are just examples of the set of dangerous phenomena which pose serious risk to the human environment in many parts of the world. The session deals with new methods of hazard analysis and modelling of complex natural phenomena by means of computer-assisted techniques. We invite the submission of contributions on innovative approaches of simulation, as well as on novel methods of model calibration/validation, and case studies. Complexity is a fundamental element at the frontier of modern scientific research, especially when considering hazardous natural phenomena. In the past, the distinction between describing phenomena in terms of solvable differential equations marked the difference between "strong" (highly predictive) and "week" (purely descriptive) science. However, differential equations for complex phenomena mostly lack analytical solutions. Fortunately, approximated numerical methods, commonly based on a discretisation of space-time, are now possible thanks to computer power. These methods have greatly extended the class of problems which can be solved in terms of differential equation systems. How-ever, many problems still are computationally located beyond these methods. While new computational techniques for the solution of complex differential systems are discovered and refined, innovative numerical methods emerge from alternative computational paradigms – such as cellular automata, neuronal nets, genetic algorithms, etc. Both differential and alternative approaches rely on the dual concept "modelling and simulation". Nowadays, assessing hazard conditions related to complex natural phenomena increasingly takes advantage of computer-assisted simulations. As a consequence, the above mentioned innovative methods (yet not completely standardised) are becoming more prevalent. State-of-the-art research in the field of computer-assisted simulation of complex natural phenomena, and of related hazard mapping techniques, together with a comparative discussion on potential and limits of different modelling approaches (e.g. approaches based on differential equations, cellular automata, statistical analysis, etc.), will be the topics of talks given by invited speakers.
http://www.cosis.net/members/meetings/programme/view.php?p_id=129

from: 1-3-05 e-mail from Giulio Iovine

May 8–11, 2005

Solutions to Coastal Disasters Conference. Charleston, South Carolina. Http://asce.org/conferencescd05/.

May 15–18, 2005

Disaster Resistant California (DRC) 2005**.** Sacramento, Calif. Sponsors: California Governor's Office of Emergency Services, The Collaborative for Disaster Mitigation at San Jose State University. This multidisciplinary conference is designed to bring together emergency management professionals; local, state, and federal government representatives; academicians; and private business partners to share ideas, technology, and resources and to promote partnerships as a means of reducing the vulnerability of individual communities to natural and human-caused disasters. For more information, contact Jessica Tran, Collaborative for Disaster Mitigation, One Washington Square, San Jose, CA 95192; (408) 924-3596; e-mail: jessica.tran@sjsu.edu; http://www.sjsu.edu/cdm/drc05/.

from: Natural Hazards Observer, v. 29, no. 3, p. 14

May 23–25, 2006

Third Tsunami Symposium, Honolulu, Hawaii. The Tsunami Society will sponsor the Third Tsunami Symposium at the East-West Center on the University of Hawaii (Honolulu) campus. This symposium is a year later than originally scheduled because the IUGG Tsunami Symposium is scheduled at the same time in 2005. For more information and registration details, go to http://www.sthjournal.org/soc.htm ♦

~ ~

A Tsunami Response

At 00:59 GMT 26 December 2004 northern Sumatra shook from what was to be the fifth largest earthquake since 1900. The resulting tsunami started its devastating journey around the Indican Ocean and northwards into the Andaman Sea.

The resulting disaster around the Indian Ocean coastlines may be the greatest affecting coastal regions in recent history. Surpassing even the devastation of the 1971 Bangladesh cyclone that claimed over 140,000 lives.

The Indian Ocean tsunami has, I'm sure, affected you as much as it has us.

So I write to you to ask for ideas, support, and opportunities to provide regions. The support I believe we can provide is in the post-disaster relief stage–that is on the long-term urban & regional planning, ecosystem re-

covery, community-based planning and so on. While clearly the emphasis at the moment is on disaster relief - as it should be - I hold grave fears that long-term recovery efforts may be poorly planned and poorly coordinated without a focused and sustained effort. This is particularly so given that media reports today suggest that communities are rapidly beginning to rebuild. I believe that the responsibility for starting this effort falls on us in the coastal planning and coastal management fields to ensure that the future risk of tsunami diasters are included into an integrated coastal risk management framework.

So, I'd like to invite your thoughts on some initial ideas, including:

* Regional workshops/events to kick-start a regional planning programme
* Specific products to support recovery - like a ŒToolkit for Long-Term Recovery to the Indian Ocean Tsunami– including lessons learned from previous events (such as those in Alaska & Chile)
* Providing data support through rapid coastal risk assessments or rapid coastal strategic planning exercises
* Regional on-line network linking coastal managers working on disaster recovery - perhaps initially an Œicoast_tsunami news group to allow discussion
* Regional Œbank of professional staff time donated to support recovery efforts

I look forward to your support and feedback to quickly mobilise coastal management and planning professionals to support the impacted communities around the Indian Ocean. Please email me your thoughts direct to robert@coastalmanagement.com.

icoast newsletter version 6.1 Jan 4 2005
Caro, Robert & Elizabeth Kay - www.coastalmanagement.com
Reprinted with permission ♦

~ ~

Tsunami Early Warning Systems
comments by John Seach
http://www.volcanolive.com/tsunami4.html
Thursday 6th January 2005

The December 2004 tsunami highlighted the small degree of preparedness the world has for natural disasters. Volcanic eruptions can also cause tsunamis (Krakatoa 1883), therefore tsunami early warning systems must also include a component of volcano monitoring. Only one third of the world's active volcanoes are monitored. One of the largest tsunamis over the past 20 years occurred as the result of a volcanic eruption in 1996 at Karymsky Lake. The strongest eruption event produced a tsunami with a runup of 30 m on the shore. This was compared to 10 m from the December 2004 tsunami in the Indian Ocean. The eruption of Krakatoa (Krakatau) in 1883 produced a tsunami of 40 m height. There is some debate over the role of Cumbre Vieja Volcano in the Canary Islands, which may be capable of producing a large tsunami which could affect the whole Atlantic Ocean, including the east coast of USA. The role of volcanic eruptions in the generation of tsunamis cannot be ignored. Report by John Seach. Reprinted with permission. ♦

~ ~

Hour by Hour
How scientists and victims around the world watched the waves
by Andrew C. Revkin
The Sunday Express, Sunday January 2, 2005
http://www.indianexpress.com/print.php?content_id=61914

[Ed. note. I found this page too late to receive permission to reprint. By all means, take a look! It gives an hour-by-hour account of how scientists and public officials (including Seattle's Vasily V. Titov and Hawaii's Barry Hirshorn) reacted to the Indian Ocean earthquake/ tsunami and indicates the problems encountered because of the lack of a warning system.] ♦

~ ~

STATE EMERGENCY MANAGEMENT OFFICES

Alaska Dept of Military & Veteran Affairs
Division of Homeland Security & Emergency Mgmt.
PO Box 5750
Fort Richardson, AK 99505-5750
(907) 428-7000; toll-free 800-478-2337
Fax (907) 428-7009
http://www.ak-prepared.com/

California Office of Emergency Services
PO Box 419047
Rancho Cordova, CA 95741-9047
(916) 845-8911; Fax (916) 845-8910
http://www.oes.ca.gov/

Hawaii State Civil Defense, Dept. of Defense
3949 Diamond Head Road
Honolulu, HI 96816-4495
(808) 734-2161; Fax (808) 733-4287
rprice@pdc.org; http://iao.pdc.org

Oregon Division of Emergency Management
595 Cottage Street NE
Salem, OR 97310
(503) 378-2911, ext. 225; Fax (503) 588-1378
http://www.osp.state.or.us/oem/oem.htm

Washington State Military Dept.
Emergency Management Division
Camp Murray, WA 98430-5122
(253) 512-7067; Fax (253) 512-7207
http://www.wa.gov/mil/wsem/

Provincial Emergency Program
455 Boleskin Road
Victoria, BC V8Z 1E7 Canada
(250) 952-4913; Fax (250) 952-4888
http://www.pep.bc.ca

Material added to the National Tsunami Hazard Mitigation Program Library
January - February 2005
Note: These, and all our tsunami materials, are included in our online (searchable) catalog at http://www.dnr.wa.gov/geology/washbib.htm

Chapman, Chris, 2005, The Asian tsunami in Sri Lanka–A personal experience: Eos (American Geophysical Union Transactions), v. 86, no. 2, p. 13-14.

Dawson, Ann; Simmons, Charlotte, 2000, Tsunami–Waves of destruction: Hawaii State Civil Defense; Hawaii Public Television, 1 video, 18 min.

Fryer, Gerard J., 2004, Reply to comment of Emile Okal on "Source of the great tsunami of 1 April 1946: A landslide in the upper Aleutian forearc": Marine Geology, v. 209, no. 1-4, p. 371-375.

Goff, J.; McFadgen, B. G.; Chague-Goff, C., 2004, Sedimentary differences between the 2002 Easter storm and the 15th-century Okoropunga tsunami, southeastern North Island, New Zealand: Marine Geology, v. 204, no. 1-2, p. 235-250.

McAdoo, Brian G.; Capone, Mark K.; Minder, Justin, 2004, Seafloor geomorphology of convergent margins–Implications for Cascadia seismic hazard: Tectonics, v. 23, TC6008, doi:10.1029/2003TC001570,2004

Nichol, Scott L.; Lian, Olav B.; Carter, Charles H., 2003, Sheet-gravel evidence for a late Holocene tsunami run-up on beach dunes, Great Barrier Island, New Zealand: Sedimentary Geology, v. 155, no. 1-2, p. 129-145.

Oahu Civil Defense Agency, n.d., Tsunami planning guidance: Oahu Civil Defense Agency, [18 p.].

Okal, Emile A., 2004, Comment on "Source of the great tsunami of 1 April 1946: A landslide in the upper Aleutian forearc", by G. J. Fryer et al.: Marine Geology, v. 209, no. 1-4, p. 363-369.

Redwood Coast Tsunami Work Group, 1997? [Status report]: Redwood Coast Tsunami Work Group, [14 p.].

Scheffers, Anja, 2004, Tsunami imprints on the Leeward Netherlands Antilles (Aruba, Curacao, Bonaire) and their relation to other coastal problems: Quaternary International, v. 120, no. 1, p. 163-172.

Tinti, Stefano; Armigliato, Alberto, 2003, The use of scenarios to evaluate the tsunami impact in southern Italy: Marine Geology, v. 199, no. 3-4, p. 221-243. ♦

Facts About the 1833 Indian Ocean Tsunami;
and an animated simulation
compiled by Lee Walkling

Compared to the Pacific Ocean , which hosts 80 percent of all recorded tsunami, the Indian Ocean is rarely host to destructive and/or lethal tsunami. The last major event occurred in 1883 when pyroclastic flows generated by the 1883 eruption of Krakatoa triggered tsunamis up to 40 m high, which caused widespread destruction and took close to 40,000 lives along the coasts of southern Sumatra and eastern Java. Significant earthquake–triggered tsunami in the Sumatra region are reported for 1797, **1833**, 1843 and 1861.
from: http://www.benfieldhrc.org/SiteRoot/tsunamis/indian_ocean_tsunami/tsunami_risk_and%20_early_warning.htm

Prior historic Sunda Trench quakes (all to the south along Sumatra):
▪Dec. 26, 2004 earthquake was the largest since 1900;
▪M 7.9 in 2000, M 8.4 in 1797, M 8.7 in **1833**, M 8.5 in 1861;
▪1797 & **1833** quakes ruptured same area only 36 years apart.
Paleoseismic data (Kerry Sieh, Caltech Univ.) show great earthquakes or earthquake couplets with 230 year recurrence interval in that area
from: http://www.csupomona.edu/~marshall/Ind_Oc_Tsunami_Lec.v4.htm
(lecture notes by Dr. Jeff Marshall, Geological Sciences Department, Cal Poly Pomona University)

According to the modeling company EQECAT, paleoseismic studies of a Mw 8.7 earthquake off the coast of central Sumatra in 1833 suggests that an earthquake of this magnitude occurs approximately every 230 years. In EQECAT's view, the Northern Sumatra earthquake, because it is located at a more oblique angle to the plate convergence vector and because it is larger, with greater slip, might have a somewhat longer recurrence interval.
from: www.guycarp.com/portal/extranet/pdf/Indian%20Ocean%20Tsunami%2001_07_05.pdf

This animation (MPG) illustrates how the large tsunami caused by the Great **1833** Sumatra earthquake spreads throughout the Indian Ocean basin. This earthquake was very similar in size and location to the one which occurred on Sunday, 26 Dec, 2004. While the tsunami struck the coast of Sumatra within minutes, it takes several hours to travel the breadth of the Indian Ocean.
from: http://www.gisuser.com/content/view/4269/2/ ♦

U.S. to Expand Domestic Tsunami Warning System
by Nick Simeone
Washington
14 January 2005
http://www.voanews.com/english/2005-01-14-voa85.cfm
Reprinted with permission by VOANEWS.com

Spurred on by last month's tsunami across the Indian Ocean, the United States is expanding its own tsunami warning system to protect all of its own coastlines. The plan would go beyond the existing tsunami detection system now being used to warn of giant waves in the Pacific Ocean.

The last time the United States was hit by a tsunami was in 1964 when a magnitude nine earthquake struck Alaska, sending waves crashing into shorelines there, as well as in Hawaii and along the west coast. In Alaska alone, the quake and tsunami killed more than 100 people.

U.S. government scientists say last month's tsunami that claimed some 160,000 lives prompted them to accelerate the expansion of the existing tsunami warning system for the United States.

"The new system will provide the U.S. nearly 100 percent detection capability for the coasts, allowing alert within minutes and in some cases within seconds of tsunami formation," says Bush administration science adviser John Marburger.

He adds that the government will spend $37 million over the next two years to expand the nation's current tsunami warning system beyond the Pacific to include the Atlantic and Caribbean coasts as well. Half the population of the United States lives in coastal areas.

The enhanced monitoring, detection and warning system could eventually be further expanded to include countries along the Indian Ocean rim which lack the kind of warning system that could have given people there time to get to higher ground before the December 26 disaster.

"What made this event even more tragic was the fact that it might have been prevented," he notes.

But officials concede, having a warning system in place would not have done much good if local governments were unable to quickly get warnings out to communities in the path of the killer wave. ♦

Tsunami Resistant Design
by Tim Walsh

The devastation in Banda Aceh serves as a reminder that a local earthquake and tsunami leave only a very short time for evacuation. In evaluating the mitigation requirements for coastal communities, the NTHMP mitigation subcommittee recognized the need for locally available evacuation structures, stating, in part:

"The impacts of flooding and high velocity water flow caused by tsunamis are strongly dependent on construction and land use/planning in the inundation area. Wood-frame structures that perform well in strong ground shaking are likely to collapse when hit by rapidly moving water. Reinforced concrete structures may provide havens for vertical evacuation. Consideration of both the effects of moving water *and* strong ground shaking need to be included in construction codes. Vegetation may dampen the water velocity in some cases, but in others, add to the debris and projectile force of the flow. No guidelines addressing these issues are available to coastal communities.

Needs: (from Dengler, 1998)

•Construction guidelines

•Coastal land use guidance such as siting of structures, open space, interactions of uses

•Infrastructure guidance such as issues facing utilities, bridges, roadway embankments

•Vegetation guidance

On November 21, 2002, members of the NTHMP steering committee convened a scoping workshop to investigate the feasibility of tsunami-resistant design in areas that are also high seismic hazard (Walsh and others, 2002). As a result of this workshop, the NTHMP contracted with Harry Yeh, Oregon State University, and Ian Robertson, University of Hawaii, to review data from unpublished tsunami surveys in order to estimate forces on buildings that survived and evaluate their structural resistance to tsunami damage. In September, 2004, FEMA and NTHMP collaborated to contract with the Applied Technology Council (ATC) to develop construction and site selection guidance for building earthquake- and tsunami-resistant structures. These buildings would likely be public accommodation buildings, such as convention centers or schools in order to leverage their construction costs. The guidance should be available in 2007.

References

Dengler, L. A., 1998, Strategic implementation plan for tsunami mitigation projects: U.S. National Oceanic and Atmospheric Administration Technical Memorandum ERL PMEL-113, 133 p.

Walsh, T. J.; Crawford, George; Eisner, Richard; Preuss, J. V., 2002, Proceedings of a workshop on construction guidance for areas of high seismic and tsunami loading: Washington Emergency Management Division, 25 p. ♦

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 information about the Jan. 1700 Cascadia earthquake and tsunami; Walter C. Dudley talks about Hawaiian tsunamis and warning systems.

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.) **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 story-teller 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 information. 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.

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. ♦

NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM STEERING GROUP

NOAA
Jeff LaDouce, Chairman, Pacific Region, NOAA/NWS
737 Bishop St., Suite 2200
Honolulu, HI 96813-3213
Ph: 808-532-6416; Fax: 808-532-5569
Jeff.Ladouce@noaa.gov

Landry Bernard, NOAA/NDBC
Bldg 1100 Room 361C
Stennis Space Center, MS 39529-6000
Ph: 228-688-2490; Fax: 228-688-3153
Landry.Bernard@noaa.gov

Eddie Bernard, NOAA/PMEL
7600 Sand Point Way NE
Seattle, Wa 98115-6349
Ph: 206-526-6800; Fax: 206-526-6815
Eddie.N.Bernard@noaa.gov

Frank González, NOAA/PMEL
7600 Sand Point Way NE
Seattle, Wa 98115-6349
Ph: 206-526-6803; Fax: 206-526-6485
Frank.I.Gonzalez@noaa.gov

James Partain, Director, Alaska Region NOAA/NWS
222 W. 7th Ave., #23
Anchorage, AK 99513-7575
Ph: 907-271-5131; Fax: 907-271-3711
James.Partain@noaa.gov

Laura Kong, Director, ITIC
Pacific Guardian Center
737 Bishop St., Suite 2200
Honolulu, HI 96813
Ph: 808-532-6423; Fax: 808-532-5576
Laura.Kong@noaa.gov

DHS/FEMA
Chris Jonientz-Trisler, DHS/FEMA
Region X, Earthquake Program Mgr.
130 228th St. SW
Bothell, WA 98021-9796
Ph: 425-487-4645; Fax: 425-487-4613
chris.jonientztrisler@dhs.gov

Michael Hornick DHS/FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607
Ph: 510-627-7260; Fax: 510-627-7147
michael.hornick@dhs.gov

USGS
David Oppenheimer, USGS
345 Middlefield Rd., MS 977
Menlo Park, CA 94025
Ph: 650-329-4792; Fax: 650-329-4732
oppen@usgs.gov

Craig Weaver, USGS
c/o Dept. of Earth & Space Sciences
Box 351650
University of Washington
Seattle, WA 98195-1650
Ph: 206-553-0627; Fax: 206-553-8350
craig@ess.washington.edu

NSF
Juan M. Pestana, NSF Tsunami Program Manager, Directorate for Engineering, Div of Civil & Mechanical Systems
National Science Foundation
4201 Wilson Blvd.
Arlington, VA 22230
Ph: 703-292-7004 jpestana@nsf.gov

Alaska
R. Scott Simmons
Alaska Division of Homeland Security and Emergency Management
PO Box 5750, Suite B-210, Bldg. 49000
Fort Richardson, AK 99505-5750
Ph: 907-428-7016; Fax: 907-428-7009
scott_simmons@ak-prepared.com

Ervin Petty (Alt.)
Alaska Division of Homeland Security and Emergency Management
PO Box 5750, Suite B-210, Bldg. 49000
Fort Richardson, AK 99505-5750
Ph: 907-428-7015; Fax: 907-428-7009
ervin_petty@ak-prepared.com

Roger Hansen, Geophysical Institute, University of Alaska, P.O. Box 757320
903 Koyukuk Dr.
Fairbanks, AK 99775-7320
Ph: 907-474-5533; Fax: 907-474-5618
roger@GISEIS.alaska.edu

Rodney Combellick (Alt.)
Alaska Dept. of Natural Resources
Div. of Geological & Geophysical Surveys
Fairbanks, AK 99708
Ph: 907-451-5007; Fax: 907-451-5050
rod@dnr.state.ak.us

California
Richard Eisner, FAIA, Regional Administrator, Governor's Office Of Emergency Services
CISN & Earthquake Programs
1300 Clay Street, Suite 400
Oakland, California 94612
Ph: 510-286-0888
Fax: 510-663-5339
Rich_Eisner@oes.ca.gov

Michael S. Reichle, Ph.D., Acting State Geologist, Dept of Conservation
California Geological Survey
801 "K" Street, MS 12-30
Sacramento CA 95814-3530
Ph: 916-324-1444; Fax 916-445-5718
mreichle@consrv.ca.gov

Don Hoirup, Jr.
California Geological Survey
Dept. of Conservation
801 K Street, MS 12-31
Sacramento, CA 95814-3531
Ph: 916-324-7354 ; Fax: 916-445-3334
dhoirup@consrv.ca.gov

Hawaii
Brian Yanagi, Earthquake Program Manager, Civil Defense Division, State of Hawaii
3949 Diamond Head Rd.
Honolulu, HI 96816-4495
Ph: 808-733-4300 ext. 552;
Fax: 808-733-4287
byanagi@scd.hawaii.gov

Glenn Bauer, State Geologist
Dept. of Land and Natural Resources
Commission on Water Resource Management
PO Box 621, Honolulu, HI 96809
Ph: 808-587-0263;
Fax: 808-587-0219
glenn_r_bauer@hawaii.gov

Sterling Yong, State Floodplain Coordinator
Dept. of Land and Natural Resources
Engineering Division, PO Box 373
Honolulu, HI 96809
Ph.: 808-587-0248;
Fax: 808-587-0283
Sterling.S.Yong@hawaii.gov

Oregon
Jay Wilson, Earthquake and Tsunami Programs Coordinator, Oregon Emergency Management, PO Box 14370
Salem, OR 97309-5062
Ph: 503-378-2911 Ext. 22237;
Fax: 503-373-7857
jmwilson@oem.state.or.us

George Priest, Coastal Section Supervisor
Oregon Dept. of Geology & Mineral Ind.
Coastal Field Office, 313 SW 2nd, Suite D
Newport, OR 97365
Ph: 541-574-6642;
Fax: 541-265-5241
george.priest@dogami.state.or.us

Jonathan C. Allan (Alt.) Oregon Dept of Geology & Mineral Industries
Coastal Field Office, 313 SW 2nd, Suite D
Newport, OR 97365
Ph: 541-574-6658; Fax: 541-265-5241
jonathan.allan@dogami.state.or.us

Washington
George Crawford, Washington State Military Dept., Emergency Management Division
Camp Murray, WA 98430-5122
Ph: 253-512-7067; Fax 253-512-7207
g.Crawford@emd.wa.gov

Timothy Walsh, Environmental Section Chief Geologist, Division of Geology and Earth Resources
PO Box 47007
Olympia, WA 98504-7007
Ph: 360-902-1432; Fax: 360-902-1785
tim.walsh@wadnr.gov

ALASKAN EARTHQUAKE
By LaVerne (Schumacher) Kearns

As the song goes:

"It was March 27th, 1964,
The earth started shaking,
Like it never shook before……"

I can remember the tune but now the words elude me. It was on the airwaves soon after the earthquake. My mother bought a copy for "prosterity", she said.

I lived on Kodiak Island, Alaska, in 1964. Kodiak is the largest island at the beginning of the Aleutian chain. It is 50 miles wide and about 100 miles long. There were several Alutiiq villages scattered around the island.

We lived in a cookie cutter housing complex known as the Aleutian Homes built by the military during WWII or right afterwards by HUD. I forget which. The roads were gravel and our house was the last one on Maple Street, nestled at the foot of Pillar Mountain. The road went up Pillar to the reservoir and wound up to the top where a White Alice was located. White Alice was a "communication station" which we called the sky spy.

I was in eighth grade and it was Good Friday. School was out and I was glad for the long week-end. I hated school and didn't want to grow up or be a teen-ager. I was a young 15 and a tomboy. I was playing outside with my younger brother, Al who was 12. We were across the street and behind a row of houses about a block from our home. We had built a fort behind the houses in some alder bushes and were checking up on it. A group of boys had torn it down a few days earlier and had declared it their own but we had built it so we were prepared to fight for it. Fortunately, to my relief, no one was around. We rearranged a few branches and were going to look for more but I reminded my brother that we had to be home around 5:30. Our parents, Bob and Carmel Schumacher, were on the bowling league and I, being the oldest, had to babysit my five younger siblings. My mother had planned on leaving by 6 pm to meet my stepfather at the bowling alley which was across from the harbor. My stepfather was working as a barber with Curley, the owner of the shop.

The sky took on a strange iridescent orange-pink color. It was about time for the sun to set but this color was definitely strange. The birds quit singing. It became deathly quiet and we saw seagulls flying silently towards the top of the mountain. My dog, Sad Sack, a cocker spaniel/black lab mix, started whining and backing up; suddenly he turned and started running towards home without a sound. My brother looked at me with his puzzled expression; he would always make his lips a perfect circle and scrunch his eyebrows. I could feel the hairs on my neck raise. The fine fuzz hairs on my arm felt like a spider crawling on me and I got the chills. I could smell a metallic smell—almost the smell of iron or nails. Then we could hear a rumble coming up from deep in the earth and getting louder as it got closer—like a train without the whistle. Suddenly the ground started shaking —like someone had grabbed it by the edges and shook it. First forward, then backwards really hard, then back and forth from side to side. We both fell down and I could hear myself scream. I told Allan to run and we both jumped up and started running toward home. We kept falling down as the earth would shake. At first it would shake a little then harder and harder. Then the ground started rolling—we could see the ground roll like waves on the ocean and I fell as one of the thigh-high waves knocked me down. It continued rolling for what seemed like an eternity. Suddenly it stopped, and just as suddenly started shaking again knocking Allan down. The ground opened up in front of him—a huge crevice which looked like it went down into the bowels of the earth for miles. I was afraid it would swallow him up. It was almost slow motion—I jumped up and grabbed him by his collar at the back of his neck and pulled him back. We could see far down into this split that had opened up. Mesmerized by the sight, we could see the pebbles, rocks and the dirt with roots, potato bugs and worms squirming. I could smell a horrible stench like rotten eggs or rotten potatoes. Then, just as suddenly, the ground slammed shut, jarring us back into our senses and we ran. By then, we were both crying and trying to yell for our mom but our cries wouldn't come out. The ground kept shaking harder and harder, back and forth, side to side and then rolling, rolling, knocking us down, again and again. The shaking was so loud! We would fall down, get up, run a few feet, fall down again, get up run some more. It seemed to take forever to run that block home.

On the street the cars were bouncing around like toys on a bed when it is jumped on. The noise was deafening from the earth—the rumble coming from deep within the ground getting louder the harder it shook. Everything seemed to have its own sound when it shook. The houses made creaking, moaning noises, the cars rattled, the telephone poles were swaying and the lines were making a swishing, twanging sound as they snapped back and forth. They didn't snap but sounded like they were going to. The shaking and rolling seemed to slow down as we reached our house. Our huskies, who bark at everything, were all in their dog houses—silent.

We jumped on the porch and the door flew open. My mother grabbed both of us, pulling us into the front room. The fish and water were sloshing out of our 20-gallon aquarium. Mom moved all six of us away from the picture window and the 3 x 4 foot mirror we had hanging on the living room wall. Then, after giving us a few good hard jerks knocking us onto the floor, the shaking started to subside. Mom managed to catch the aquarium and hold it onto the buffet, her legs spread, knees bent, as she was trying to stand and keep her balance. I remember this

vividly because if it wasn't so scary her stance would have been funny.

When the ground quit shaking we could hear the deathly silence. After a few seconds of all of us looking around and at each other with wide eyes, Mom immediately tried to phone my stepfather, Bob, who was working at his barber shop downtown. While she was on the phone, the sirens went off and all the dogs in the neighborhood started howling. I could tell she was scared—we all were. The babies—my two youngest brothers at 2 and 1— were crying. My little sister was 4 and my other brother was 9. There was no answer and she went and looked out the front door. My sister went and clung to her leg and mom pushed her back inside then turned and told me to go turn the pilot light off on the propane kitchen stove. The small kids were crowded around the front door with my mother and when she closed it my sister got her fingers smashed. She started screaming and her fingers were bleeding. Mom was a Licensed Practical Nurse and knew what to do. She bandaged my sister up and then went and turned off the pilot light to the furnace. She said she should have turned the furnace off first and wondered out loud if we should go up the mountain because there will be tidal waves. She had tried several times to call Bob again but there was no answer then the line went dead. People were driving up Pillar and we watched them as they went up the mountain. Some people were walking with blankets and whatever they could carry and there wasn't any panic.

Finally Bob came home and said the road was blocked with what looked like boards and trash. He couldn't figure out why the police would block the main road and he had to take another way to get home. We found out later that the first wave had come in and had missed him and the shop. My parents decided to go to higher ground so we all got in our '54 Ford and drove up the mountain. By that time, it was getting crowded with more people and we could see the water was out of the harbor with boats sitting on the floor of the harbor.

The beach around Kodiak has black sand and lava-like rocks. We could smell the ocean and it has a different smell when the tide is out and when the beach is covered with seaweed, urchins, small octopus, starfish, and other marine life. It is amazing how fast the water went out. Bob decided that we had better just stay in our house since it was far enough out of the waves. We could see the damage the wave did and he was worried about looters in our house so we drove back home. I was disappointed I didn't get to see the next wave come in. When we got back home Al and I ran to the hill behind our house. From there we could see the harbor. The water was going back out, leaving everything sitting on the bottom again. It was twilight and it looked so dark. Then we could hear the water rushing in, roaring as the last wave came in. We could hear the snapping of timber, creaking and groaning of wood, boats and buildings as the water pushed them farther in shore. The sound was so loud.

There were four waves that the quake produced and they caused a lot of destruction and death. My native friend's mother told us to get to high ground if there ever is a quake. I was looking down at the harbor in the twilight and thinking about what she had said and wondered if my friend was ok since they lived about a half mile from the shoreline. Later, I found out their house was damaged by water and the family had left Kodiak to live with relatives in Washington.

That night and for several days afterward, there were aftershocks. We could hear them rumble from deep in the earth and come up to the surface to shake us almost out of bed. Needless to say we didn't get much sleep that first night. I was afraid that the walls of my bedroom would fall down on me.

In the aftermath, I learned that one of my classmates was swept out to sea with the first wave and her house was destroyed. Her family had a ranch outside of the naval base and she was never found. I don't remember how many people were killed on Kodiak. Our parents opened our house to people who lost theirs and three people stayed with us for about two weeks.

Communication to the mainland was cut off except by ham radio and my mom had a friend who was a ham operator. She got word to her mother, who lived in Oregon, that we were fine. We were a lot better off than many people. Our house wasn't damaged with the exception of a couple of dead fish and a few broken plates and cups that were shaken out of the cupboards. We had plenty of food—my mother canned fish, berries and vegetables every year (and she taught me). She would buy in quantity so we had cases of canned milk and other staples. We could cook on the propane stove and had propane heat. It still was cold at the end of March and I was so grateful that we still had the basics. The water main was broken, and we went to the reservoir to get buckets of water. Mom boiled it first before we could use it. Many people didn't have the basics. Some didn't even have their homes anymore. My stepfather's workplace was intact with just minor flooding. Many canneries were swept out to sea as were boats, homes and businesses and people. The bowling alley was gone. The harbor was gone. Most of downtown was gone. Just like that…….. gone in a few minutes. Mother Nature is so awesome.

Websites:
http://209.165.152.119/city/index.html
http://www.photolib.noaa.gov/historic/c&gs/theb1343.html
http://www.geocities.com/abaccola/kodiak.html
http://www.vibrationdata.com/earthquakes/alaska.html
http://www.kodiak.org/ ♦

Special thanks to LaVerne for writing this eyewitness account for *TsuInfo Alert*!

INFREQUENTLY ASLED QUESTIONS
compiled by Lee Walkling

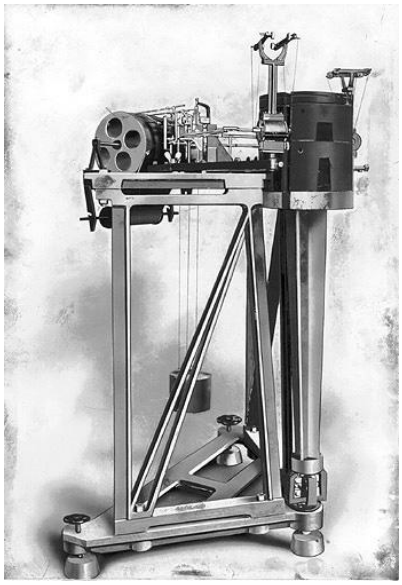
When did El Salvador get its first seismographs?

"The first seismological equipment installed in the region dates from 1882. In El Salvador, seismological observations began in the late nineteenth century when 15 Wiechert (illustrations below) seismographs arrived in the country.

A network of 12 short-period telemetric seismic stations became fully operations in El Salvador in late 1984; this network currently consists of 18 seismographs. Earthquake monitoring in the other countries of the region by permanent networks has operated since the 1970s. In the 1990s, all the countries in the region acquired SEISLOG data acquisition systems and new equipment, including broadband stations, which were donated to improve their seismic networks. In 1998, the Central America Seismological Center (CASC) was established in Costa Rica, marking a new state in seismological observation in the region. The goal of this center is to locate regional earthquakes and compile seismic databases to be used in the estimation of seismic hazard."

Fernandez, Mario; Escobar, Carlos Demetrio; Redondo, Carlos A., 2004, Seismograph networks and seismic observation in El Salvador and Central America: Geological Society of America Special Paper 375, p. 257-267.

Abstract above taken from GeoRef 2004/9, AN 2004-059758



http://www.eas.slu.edu/Earthquake_Center/Instruments/wiechert_ills.html
Detailed illustration; side view of small Wiechert horizontal component seismograph.
(J. B. Macelwane Archives, Saint Louis University) ♦

Who wins the Bad Timing Award for 2004?

It might go to rock singer Kristin Hersh. A week before the Asian tsunami hit, she mailed rock critics her first full CD with her new band. The band was named for the term that describes the lowest sound audible to the human ear…50 Foot Wave. The name also fits the group's surf-punk style of music. What seemed like a great name in early December now has negative associations with the gigantic waves that killed more than 200,000 people. However, Kristin says she's standing by the CD with the unfortunate band name; it will be released in March as planned. The CD itself is entitled "Golden Ocean," a term used by one of Kristin's sons to describe how the lights of Los Angeles look at night.

Who wins the Most Novel Tsunami Mitigation Plan Award for 2005?

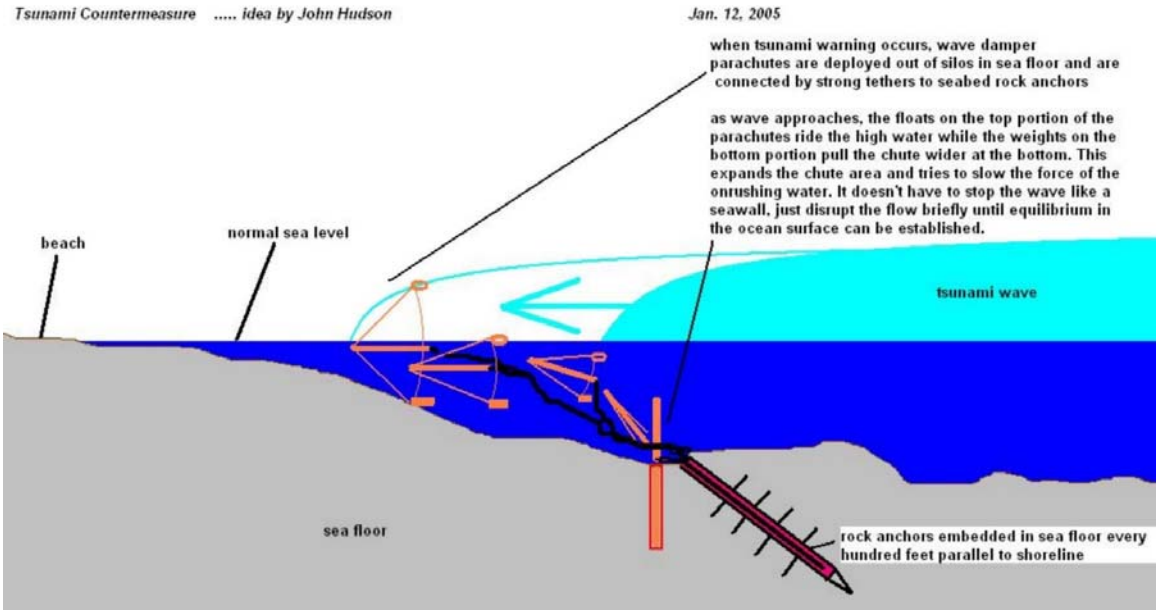
Since the tsunami tragedy in Asia, I have been wondering if there is possibly a way to repel a tsunami in some way, either using its own energy turned back on itself or damping the speed or the force of the rushing water. A giant seawall would get the job done, but be costly and impractical politically. While there exist other more exotic means of repelling a major ocean wave as it comes ashore, I had an idea that scientists and government officials might consider worthy of further study.

In critical areas where cities are built right up next to the open ocean, it may be feasible to mount canisters in the ocean floor that contain parachutes that can be deployed when a tsunami is imminent. The parachutes would be tethered to rock anchors drilled in the ocean floor so that the energy in the wave is transferred back into the earth at that point rather than later when it reaches shore. The parachutes would be required to be very strong and the tether would have to be equally strong, but the engineering is not overwhelmingly complex. It would be better to have a very elastic type tether, similar to bungee cords, where the force of the wave would be transferred slowly rather than with a jerk. The parachutes might be square, with floats on the top side and weights on the bottom, so that the incoming wave would spread the chute to its maximum dimensions and keep it inflated during the most critical time when the wave speed and volume were highest.

The countermeasure would only need to function for a short time, possibly 30 seconds or so, in order to do its job. The wave need not be stopped completely, just disturbed and slowed until the normal ocean levels could be restored by gravity. The chute could even be porous, allowing a measured amount of flow that was not catastrophic to either the chute or the shoreline.

This idea would be, in essence, an instant sea wall that protects critical areas from catastrophic disaster. It might even be used in hurricanes to lessen the sea surge. I believe the cost of such a system would be minimal compared to the protection it would provide. Once deployed, the parachutes could be reloaded into the canisters and activated again for another incident.

Thanks for your time,
John Hudson (Jan. 12, 2005 e-mail)



How does the Banda Aceh earthquake compare with others?

This is the fourth largest earthquake in the world since 1900 and is the largest since the 1964 Prince William Sound, Alaska earthquake.
from: http://earthquake.usgs.gov/recenteqsww/Quakes/usslav.htm

TsuInfo Alert has not been licensed to include the article about a tsunami in Virginia in the online edition. The article can be found at www.timesdispatch.com/servlet/Satellite?pagename=RTD/MGArticle/RTD_BasicArticle&c=MGArticle&cid=1031779973304