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

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Tsunami ready?

By Chad Richins
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A series of local earthquakes has coastal residents and government officials alike talking about what to do in the event of a major disaster.

The 4.7 magnitude earthquake, centered just 12 miles west of Newport at 11:06 p.m. on Thursday, woke many local residents, but no damage associated with the event has been reported.

The relatively low-magnitude trembler was felt as far north as Astoria, as far south as Reedsport, and inland across the Willamette Valley to the base of the Cascade Range, according to reports from the United States Geological Survey. Even within the Homeland Security apparatus, minimal attention is being paid to matters beyond prevention of terrorism-related disasters, as Secretary Ridge himself has stated. Only recently have inquiries been made about mitigation possibilities and recovery issues stemming from a WMD-related event. Aftershocks, which were too small to be felt, continued to be recorded as late as Monday morning, when a 2.3 magnitude quake occurred in the same area.

Oregon State Geologist and Director of the Oregon Department of Geology and Mineral Industries, Dr. Vicki McConnell, said in a prepared statement, "We find the areas and locations reported are very similar to the 4.9 magnitude earthquake that occurred on July 12. Both earthquakes were located very near to each other, released energy at similar depths and most likely had the same kind of movement along the fault."

A single earthquake was recorded on land in recent weeks—a 1.5 magnitude tremor recorded 15 miles south-southwest of Newport just before midnight on Aug. 10.

Tsunami preparations

While earthquakes can be devastating, of particular interest to coastal residents are quake-generated waves often referred to as tsunami, which means "port wave" or "harbor wave."

In the event of an approaching tsunami, Lincoln City Manager David Hawker said the city is prepared to broadcast street by street from city vehicles to warn those in the inundation area. Hawker said the city is in good shape for a major emergency, but more can definitely be done to improve that readiness.

"I think it can be better and we're working on that," Hawker said. "We're fine tuning communications and operations because I'm not satisfied that we have the necessary means to get the word out to the public."

Both city and county emergency officials also have satellite phones that enable them to stay in contact with state and federal officials in the event of a major disaster. The county is currently developing a new support vehicle that will aid in local communications. That vehicle should be ready in a month, according to Lincoln County's Emergency Services Department Manager Jim Hawley.

Hawker said in the event of a large earthquake that collapses all local bridges, only the D River bridge could forseeably be repaired in a short amount of time. Hawley concurred and said help for local residents would probably have to come from cities inland.

"People cannot rely on the city or the fire district or the state or the county," Hawker said. "They have to be

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Natural Resources
Doug Sutherland - Commissioner of Public Lands

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(continued from p. 1)
prepared themselves." Hawley said earthquake and tsunami education efforts have been successful with locals, but visitors are often unaware of potential dangers.

"We have a permanent population of 4,700 people in this county and right now we probably have 100,000 people here, and a lot of them can't even spell tsunami. They have no idea," Hawley said. Residents and visitors alike should abandon local beaches at the first sign of a tremor due to the risk of a tsunami, Hawley said.

Lincoln City Emergency Coordinator Sheridan Jones agreed with Hawley that after any seismic event, beaches should be cleared, Jones added that anyone living within 50 feet of elevation from the shoreline should turn on a radio or television and listen for news of the event.

Jones also noted that the local tsunami warning sirens are not considered by the city to be part of the early warning system until they can be placed higher and cover more area.

"Any earthquake offshore is your warning," said Jones.

Water rears up

Most tsunami are just a few inches high as they travel across the open ocean and people on boats at sea may not even realize they have passed. When tsunami approach a coastline and reach shallower water they can rear up to a height of several feet, or in rare cases, dozens of feet.

A tsunami generated by an Alaskan earthquake in 1964 caused several deaths in Oregon and more in California. The initial quake shook the ground for more than four minutes and is the largest earthquake ever recorded in North America. At a magnitude of 9.2, it is also the second largest ever recorded in the world. The actual quake, however, killed less than a dozen people, but the tsunami generated by the upheaval of land and displacement of water killed 119 people from Alaska to California, including four children visiting Beverly Beach near Newport with their family. The tsunami killed 10 people in Crescent City, Calif., many of whom were lost when the first wave subsided and they returned to their homes.

According to materials issued by the Oregon Office of Emergency Management, in the event of an earthquake, if you find yourself indoors, you are advised to drop to the ground, find cover, and hold on, protecting your eyes by pressing your face against your arm until the shaking stops.

If you are outdoors, move quickly and safely into the open, away from electrical lines, trees and buildings, drop to the ground and wait for the shaking to stop.

If you are driving, carefully and slowly bring your vehicle to a stop at the side of the road away from traffic. Do not stop on or under bridges, under power lines or near roadway signs that might fall.

Officials advise residents not to call the 9-1-1 emergency line unless immediate assistance is needed. The county 9-1-1 line received more than 200 calls in the first hour after the Thursday quake, which could have tied up lines needed for emergency dispatching.

Jones also advised preparing for at least one week with no utility services and no medical attention, pointing out that more than one week after Hurricane Charley hit Florida, hundreds of thousands of residents are still without electricity.

Tsunami inundation area maps are available at city hall and the county website has other emergency information at www.co.lincoln.or.us/emergency.

The News Guard's Ezra Casteel contributed to this report.

The National Oceanic & Atmospheric Administration is sponsoring a program called STORM READY or TSUNAMI READY.

STORM READY is primarily for states or parts of state that must respond to weather-related hazards. TSUNAMI READY is designed to make sure coastal areas are prepared for all hazards including local or distant tsunamis.

Under the direction of Tyree Wilde, Warning Coordination Meteorologist for NOAA, the City of Lincoln City has been working hard to meet the TSUNAMI READY criteria in the application form. Lincoln City, under the direction of Sheridan Jones, has been working to put in place emergency plans as well as an equipment training program for all hazards.

This effort was not put forth in isolation. It was a team effort by the State OEM (Oregon Emergency Management); DOGAMI (Department of Geology and Mineral Industry); County Emergency Center; City Departments, Fire Department and local hospitals.

As a result of this effort the City is close to meeting all the criteria for certification as TSUNAMI READY. One project under the direction of Lila Bradley and assisted by Jack Preston is to complete the Tsunami signing project. The signs designate evacuation sites. The tsunami evacuation maps are available at City Hall, Visitor Information Center, Chamber of Commerce, and various motels in Lincoln City.

NOAA recommends all citizens have their own weather alert radios. These radios sit quietly until there is a need to trigger an alarm signal. Generally this would mean a severe event—flooding, fire—and NOAA is in the process of finalizing how or when to trigger an alarm for terrorist activity. Costwise the sets are the best source for the arrival of distant tsunamis.

If there is a local quake that disturbs you, there is no time for a warning to be issued. HEAD TO HIGH GROUND. Most land-based quakes are not likely to generate a tsunami.

All emergency plans are based on the idea the citizens of a community are able to take care of themselves until help can arrive. Be sure you and your family have a communication plan, an emergency kit, car kit and 72-hour supply (of water/food/medicines) in your house. To request a map, contact Annie Mueller, 996-2154. ♦

From webpage: http://www.thenewsguard.com/news/story.cfm?story_no=997

National Tsunami Hazard Mitigation Steering Committee Meeting (Excerpts of Minutes)
May 18–20, 2004, Anchorage, Alaska

Attendees
Jeff LaDouce – NOAA/NWS (Chair)
Roger Hansen – State of AK
Frank González – NOAA/PMEL
Rodney Combellick – AK Geologist
Landry Bernard – NOAA/NDBC
Scott Simmons – AK DHS Emerg.Mgt.
Charles McCreery – NOAA/PTWC
Ervin Petty – State of AK
Vasily Titov – NOAA/TIME Center
Richard Eisner – State of CA
Eddie Bernard – NOAA/PMEL
Don Hoirup – CA, Geological Survey
Paul Whitmore – NOAA/WC-ATWC
Brian Yanagi – State of HI
James Partain – NOAA/NWS
George Priest – State of OR
Laura Kong – NOAA/ITIC
George Crawford – State of WA
Chris Jonientz-Trisler – DHS/FEMA-X
Timothy Walsh – State of WA
David Oppenheimer – USGS
Stuart Koyanagi – USGS/HVO
Craig Weaver – USGS

Review of Action Items from the May 2003 Meeting:

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.

Action: Craig Weaver

Craig Weaver from the USGS also briefed on Congressional interest in the NOAA Weather Radio on a Pole project—(AHAB) All Hazards Alert Broadcast.

Action Item 2: Take the 14 program goals and formulate a new 5-year plan.

Action: Jeff LaDouce, Rich Eisner, volunteers.

Status: After three iterations of a spreadsheet, inputs have been received. CONTINUING.

Action Item 3: Form a Technical Advisory Board.

Action: Eddie Bernard

The group decided to have two levels of technical oversight. The first level is to continue to hold 5 -year reviews by outside reviewers to evaluate the overall program directives and technical quality. The second level of technical oversight is to form ad hoc technical groups to address specific technical issues.

Status: OPEN

Action Item 4: Provide names of presenters for future meetings, e.g., social scientists, local emergency managers and Warning Coordination Meterologists (WCMs) national and local media, and researchers. Jeff LaDouce will prepare the agendas and invite the presenters.

Action: James Partain

There was no presenter for May meeting. James Partain will coordinate a subcommittee with WCM's and report on issues and actions of results.

Status: ON GOING

New Action Item 5: The group was asked for comments on NDBC Draft DART Concept of Operation Document, paying specific attention to what number to use for the availability of the system.

Action: Jeff LaDouce

Status: OPEN

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

Action Recommendations.

Status: Evaluation of step two: Discuss potential adaptation of elements of Hurricane Liaison Team (HLT) from March tsunami coordination meeting.

Action: Jeff LaDouce and Chris Jonientz-Trisler

Status: The HLT presentation was made at March tsunami coordination meeting. Evaluation continues as to what can be adopted from the HLT process. CONTINUING.

New Action Item 7: The group was asked to provide in writing the Lat/Long of the location for the 7th and 8th DART buoys for NDBC.

Action: Jeff LaDouce

Status: OPEN

New Action Item 8: Cascadia Region Earthquake Workgroup (CREW). The group was asked to form a working group for initiatives. Terms of reference for 60 days from 5/19.

Action: George Crawford

Objective: Develop protocols for NTHMP States and NWS for a Cascadia Subduction Zone Earthquake. The protocols should be developed using the Cascadia Subduction Zone Scenario developed by Cascadia Region Earthquake Work Group (CREW).

Interface documents.

- Federal Response Plan (Tsunami) – See Action Items # 1 and 6
- NEHRP Clearing House Plan
- CREW Cascadia Subduction Zone Scenario Process:
- Open dialogue with Cascadia Region Earthquake Work Group to use their Cascadia Subduction Zone Earthquake Scenario and have them form a working group. CREW should submit a proposal to the NTHMP fall steering meeting.
- Develop a table top exercise that will bring out coordination issues and procedures that would be required for such an event. The table top should provide a clear opportunity for the private sector. Potentially two table top exercises should be scheduled:
  - NTHMP and NWS.
  - Each State to include stakeholders and private sector.
- Merge input from both table tops into a report.
- NTHMP form working group to develop draft guidance/procedural document.

• Coordinate at all levels (Local/State/Federal) and finalize (Final document could be done through CREW).
• Implement process.

Status: OPEN

New Action Item 9: Modeling by Rich Eisner for inundation and evacuation maps.

Action: Rich Eisner

Status: OPEN

New Action Item 10: Social Scientist interpretation regarding AHAB broadcast

Action: Rich Eisner & Paul Whitmore

Status: OPEN

New Action Item 11: State Tsunami Warning & Tsunami Warning Center Requirements. Chip McCreery to get in touch with State contact and inquire about state requirements: who, where, how many, how much info, media, vs. public, media vs. the warning centers.

Action: Chip McCreery Status: OPEN Chris Jonientz-Trisler has provided the DHS/NOAA Agreement on All-Hazards Net & EAS

New Action Item 12: Establish a working group driven by Emergency Management needs, that will develop recommendations on technical and policy issues related to NTHMP mapping and modeling efforts.

Action: Frank González

Status: CLOSED

Next meeting to be held: November 2–4, 2004, in Oakland, Calif. Individual cancellations must be made at least 72 hours prior to individual's scheduled date of arrival, in order to avoid a no-show charge.♦

For the complete report of the Minutes, go to http://www.pmel.noaa.gov/tsunami-hazard/steering_group.html

(Too late for the August issue)

September is a month for Washington residents to prepare for natural and man-made hazards

CAMP MURRAY – Local, state and federal agencies will make the month of September a time for Washington residents to prepare to be safe from natural and man-made hazards.

Gov. Gary Locke has proclaimed September to be "National Preparedness and Weather Radio Awareness Month" and urged state residents to increase their knowledge and awareness of emergency preparedness actions they can take to make Washington "safe and secure" for the 21st Century.

The governor made the following recommendations:
• "Residents should prepare themselves to be self-sufficient for at least three days following an act of terrorism or natural or man-made disaster.
• State agencies and state employees should prepare so they can continue to provide essential public services after a disaster and support the state's disaster response and recovery mission.
• The use of information from the National Oceanic and Atmospheric weather radios can reduce the loss of life and property from all hazards, including terrorism.

"NOAA weather radios save lives for the cost of a pair of shoes," said Ted Buehner, Warning Coordination Meteorologist at the Seattle Weather Forecast Office.

"We want to make NOAA weather radios as common as smoke detectors in homes."

"Weather radios are available at most radio electronic retailers and Internet outlets and have a warning alarm that provides instant alerts around the clock," Buehner said consumer incentive information about NOAA weather radios can be found at the Washington Emergency Management Division website at emd.wa.gov.

Major General Timothy J. Lowenberg, director, Washington Military Department, said the department's Emergency Management Division had prepared a new brochure to provide tips and suggestions to help citizens to prepare for possible terrorism events.

He said state and local emergency managers urge state residents to implement the brochure's preparedness steps at home and at work because "individual preparedness leads to state preparedness and helps retain our focus on freedom."

The new terrorism preparedness brochure is available from city and county emergency management agencies. Barbara Everette Thurman, EMD Public Education Manager, can provide additional information and background on Washington preparedness at (253) 512-7047.

For immediate release: August. 24, 2004. Contact: Rob Harper, EMD, 253-512-7005; Ted Buehner, NWS, 206-526-6857.♦

PARTNERSHIPS FOR DISASTER EDUCATION

The American Red Cross has a long history of educating the public about natural and technological hazards and ways to reduce the effects of these hazards on people and their property. Documents in our archives date back to the early days of our organization's founding, and include a letter from Red Cross founder Clara Barton to Willis L. Moore, then chief of the U.S. Weather Bureau [now the National Weather Service (NWS)] in Washington after the Great Galveston Hurricane of 1900. In that letter Barton wrote, "I have spent many days now in the community of Galveston, seeing first-hand the damage and destruction that nature has wrought. I envision ways that our two organizations can work together to help people learn about the devastating potential of storms and methods the public can employ to reduce danger to families."

Thus, the idea of working together is a long-established one. There is evidence of jointly developed public education materials in the 1950s and the 1970s. These collaborations did not last, however. What we think worked then is what is working now: people in different agencies agreeing to work together, forming partnerships, and sharing the goal of public education.

But doing so requires continued commitment among agency representatives. When representatives move on to other positions, those remaining must continue the commitment. What appears to be the driver of collaboration and coordination on public education is the willingness to:

- Get to know counterparts in other agencies. Knowing a counterpart means spending a lot of time with him or her so that trust and a true understanding of knowledge and capabilities are built. This process takes time.
- Share information, and bring together people from separate divisions within his or her organization.
- Share the spotlight and recognition.
- Compromise.

In the late 1980s, a survey of our collaborative efforts revealed some local-to-local relationships between entities such a local emergency-management agencies and local NWS offices. But collaborative relationships on public education at the national level had diminished. People and organizations had changed. It was time to rebuild.

The rebuilding process began with the identification of specific individuals in other national agencies who were responsible for public disaster education. At that time, as is the case now, the responsibility for developing and disseminating disaster safety information was decentralized and spread among many agencies. For example, those working the Federal Emergency Management Agency (FEMA) Earthquake Program in the 1980s also wrote and disseminated earthquake-related documents for the public.

It was important for local-agency personnel to invest a lot of time getting to know their counterparts in these national agencies. For example, when we at the local level got to know those responsible for dissemination of information on severe weather at the NWS, they introduced additional specialists who share information on hydrology (flooding) and sever-weather predictiton (at other NWS centers such as the National Hurricane Center and National Severe Storms Laboratory). Further, we often found that one counterpart knew another one in another agency as well, so introductions could be made and relationships with additional hazards professsionals could be established.

Part of the process of getting to know counterparts included also getting to know what resources the other organization could bring to disaster-education efforts, We found that each organization was developing materials with scientific and disaster-preparedness information in them. We found that some agencies were better at some aspects of the public education effort than others, however. For example, the Red Cross, with chapters in communities nationwide, could reach millions of people. The Red Cross is not a scientific or research organization, however, so it depends on the technical expertise and review provided by experts in other agencies. These agencies, on the other hand, could write technical information very well, but needed help in understanding how to write the information in practical, common terms.

We also found that the resources dedicated to public education included assigning staff to research and write information, as well as fund printing and publication of the agency's materials. However, as we became more familiar with each agency's information, we discovered that information about a certain topic in one agency's documents was at times different from information about that topic in another agency's materials. For example, two national agencies' docu-

ments on flood safety in the 1980s had lists of "do's and don'ts." However, there were far more "don'ts" than "do's," and when someone is told not to do something without the corresponding information of what to do instead, the reader can easily have questions about correct and recommended actions, In such an instance, part of the "compromising" that had to occur was arriving at an agreement on how content was to be written.

It's important to point out that in addition to building relationships with technical experts, we also needed to build relationships with and learn from hazards researchers and their academic pursuits. We found that it was rather easy to write a technically correct public-education piece. Researchers, however, were pointing out to us in various ways that simply writing good technical information was not necessarily the best way to get the information across to the audience to motivate action. This is why we found participating in the Natural Hazards Research and Applications Information Center's summer workshops in Boulder, Colorado, to be so valuable. Researchers are present at these workshops, and they can describe their research in terms that provide the background and philosophy of their approach, as well as practical applications of their research to the work of public education and outreach. Indeed, learning what research has been done and its intent has been tremendously valuable in the process of developing quality public-education materials that motivate people to take action.

Throughout the late 1980s and 1990s, relationships among agencies were further strengthened. Trust was built, which is exceptionally important to the process. It became clear that wanting people to know what to do, as well as have accurate information, was our common goal.

We also learned from research that the public trusts information much more from agencies who present their information using similar methods and identical materials. The trust and recognition of "joint-logoed" materials resulted in tremendously increased demand for such products. For example, in the late 1980s FEMA, NWS, the U.S. Geological Survey, and the Red Cross each had separate documents on hazard topics such as floods, tornadoes, hurricanes, earthquakes, and general disaster preparedness. In the early 1990s these agencies decided to combine some of their materials and disseminate them as one document with multiple agency logos on them, rather than just one agency logo. When that happened, we observed that demand for these materials skyrocketed, increasing geometrically. For the most part, this was a good thing; it put strains, however, on each agency's ability to meet the increased demand. We are still struggling with this issue to this day.

Surveys of recipients of jointly-developed materials revealed that:

- People said that they trusted the information more, because it was obvious to them that we agreed on content and therefore it must be better.
- People were less likely to shop around for information from different sources that provided an "easy way out." For example, before 1990 some agencies still recommended applying tape to windows for hurricane wind protection. NWS taught us that all tape does is prevent windows from shattering; windows still get broken. When windows break, damaging winds can enter a home or building and destroy it. Since we combined our hurricane-education materials, no national agency recommends using tape now, and we have observed that the use of tape for hurricane window protection has declined throughout the 1990s.
- People were getting information from different sources. It was clear that not all agencies could reach everyone who needed the information. Our combined efforts reached far more people than individual efforts did.

Further, and most gratifying to all of us in the process, poststorm or postearthquake research and surveys revealed that many people were following recommendations made in jointly-developed materials because the materials were readily available to them and had become for all intents and purposes their only option, and the materials were practical, understandable, and consistent.

In the mid-1990s, we formalized the bilateral relationships built between the Red Cross and individual national agencies to form the National Disaster Education Coalition (NDEC), of which this author is proud to serve as "convenor." Forming this coalition formalized what were bilateral relationships between the Red Cross and specific agencies, or relationships between other agencies. The coalition's primary goal is to bring together each participating agency's expertise, skills, and resources toward one common goal: ***consistent public education.***

If we have learned anything over the years from reading hazards research and talking to academic professionals as well as to the public, it is that consistent information is the key to suc-

cess. When we are all saying the same thing, people have more respect for the content of the information we provide, as well as for our individual organizations.

The downside to increased credibility and consistency of information is that individual agency recognition is diminished. We cannot count the number of times when emergency managers ask for "those Red Cross brochures" and Red Cross representatives ask for "those FEMA brochures" when in fact the brochures are one and the same. We recognize that individual agency recognition and an agency's reputation with the public are important to agency management. Sometimes, budgets and staffing for public-education efforts within each agency are tied to the awareness and recognition of the specific agency.

We argue, however, that recognition of the specific agency must be less important than the good derived from increased consistency of information and the building of public trust and confidence. After all, the common goal is wanting the public to know what to do and how to respond. People have said they find jointly developed materials to be far more credible and these joint materials have been shown to be much more effective in motivating action. So a compromise on individual agency recognition must be part of the package.

NDEC is not funded by any agency. It is truly a coalition composed of like-minded people from many agencies who agree that quality public-education efforts, materials, and approaches are very important. The coalition meets monthly in the Washington area and has enjoyed success in bringing people together, sharing ideas and information, and ensuring that we keep our goals for quality public education top-of-mind.

One of the coalition's major products is "*Talking About Disasters: Guide for Standard Messages*." This guide provides information about 13 natural hazards as well as general disaster preparedness. What is most intriguing about this guide is that *all national agencies involved in public education agree on the information presented*. (That was no small feat!) The guide provides information on the nature of natural hazards, as well as messages on what to do before, during, and after an event. Most important, the guide provides an explanation with each message so that the reader can understand why the message is written the way it is. For example, some people still believe that one should open windows in case of a tornado. The guide explains why that information is not true and should be "retired" into the annals of folklore.

The content of the guide is in the public domain, and it is designed to be used by communicators, educators, media representatives, and anyone who shares our goal of disseminating quality public education and information. We encourage everyone to become familiar with the guide and use it for written materials, Web sites, TV/PSA scripts, and any other public-education materials. The guide is published on the Web sites of the Red Cross, FEMA, and the Institute for Business and Home Safety, and is linked by other participating agencies to one or more of the publishing agency's Web sites. The Red Cross link for the guide is: http://www.redcross.org/disaster/safety/guide.hmtl

Overall, the process of bringing people together to share information and motivate public action toward disaster preparedness and mitigation actions has been rewarding. There have been struggles along the way, but the outcome has been well worth the effort.

For more information about NDEC, or about the contents of this article, please contact the author. ♦

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NEWS

Tuesday, October 14, 2004 is the UN Day for Natural Disaster Reduction.

For more information, see the website at http://www.unisdr.org/

Asia Pacific Natural Hazards Information Network

The Pacific Disaster Center (PDC) in Kihei, Hawaii, is hosting the Asia Pacific Natural Hazards Information Network (APNHIN), a resource that enables disaster and resource managers, planners, governments, and non-governmental organizations to tap into high-quality geospatial data for the purpose of reducing disaster risk and vulnerability for the three billion people who reside in the Asia-Pacific region. The network provides access to a wide variety of information, including remote sensing and other Geographic Information Systems (GIS) data. APNHIN comprises a community of organizations who create and share disaster and hazards-related information.

A unique feature of the network is the ability to access real-time information by constantly updating dynamic data, such as tropical storm tracks and forecasts as well as information on other natural hazards (e.g., earthquakes, volcanoes, and wildfires). Built upon the underlying specifications and technologies of ESRI's Geography Network (http://www.geographynetwork.com), APNHIN is customized to provide natural hazards information for the Asia-Pacific region.

The PDC provides applied information research and analysis to develop more effective policies, institutions, programs, and information products for disaster management and humanitarian assistance communities of the Asia-Pacific region and beyond. For more information about APNHIN, including how to become a network participant, contact Chris Chiesa at (808) 891-0525, x953, e-mail: apnhin@pdc.org, *or visit* http://apnhin.pdc.org/.
From: Natural Hazards Observer, v. 29, no. 1, p. 3, September 2004

National Preparedness Month

September was National Preparedness Month, a month-long campaign to engage Americans in emergency preparedness and provide a variety of opportunities to learn how to prepare for an emergency and become better informed about relevant threats. Supported by a coalition of more than 50 national organizations, including the U.S. Department of Homeland Security (DHS), the America Prepared Campaign, and the American Red Cross, the effort featured events hosted at the federal, state, and local levels and by individual communities, private businesses, and nonprofit organizations. For more information, contact Kristen Gossel or Lara Shane with DHS at (202) 282-8010. Useful Web sites include http://www.americaprepared.org/ and http://www.ready.gov/.
From: Natural Hazards Observer, v. 29, no. 1, p. 7, September 2004

FEMA does not endorse disaster-related products or services

While Department of Homeland Security (DHS) is endorsing antiterrorism technologies, FEMA does not endorse specific products or services (i.e., brands). Falsely advertised endorsements should be reported to FEMA's Office of the Inspector General (OIG). Alerts or complaints can be made to OIG, FEMA, 500 C Street, SW, Washington, DC 20472; (800) 323-8603.
From: Natural Hazards Observer, v. 29, no. 1, p. 9, September 2004

A gigantic tsunami in the Hawaiian Islands 120,000 years ago

Honolulu - Arguments rage about onshore marine fossils found in the Hawaiian Islands: were they left by gigantic tsunamis, or are they shoreline deposits exposed by massive uplift of the islands? Controversy continues because the islands involved (Lanai, Molokai, Maui) could be either sinking or rising. Now an international group of scientists led by researchers at the University of Hawaii have sidestepped the problem by looking at Kohala volcano on the island of Hawaii, which is known to be sinking at roughly one inch per decade. Guided by a photograph from the 1930s, the scientists have found an on-shore deposit of smashed-up marine shells, angular chunks of lava rock, lumps of soil, and fragments of coral, all cemented together by what was once coralline sand. The deposit rests on a soil whose upper horizons have been stripped off, leaving behind truncated roots of long-vanished shrubs. All the identifiable species in the deposit are from a back-reef environment quite unlike the present shoreline.

The closest back-reef environment is a drowned coral terrace now at a depth of 1,400 feet. The scientists have dated the on-shore deposit and found that it is 120,000 years old, the same age as the drowned terrace and the same

age as the Alika 2 Landslide, the last giant landslide down the western slope of nearby Mauna Loa volcano. They conclude that Alika 2 threw up a gigantic tsunami which surged across the terrace and penetrated almost 4 miles inland, smearing fossil-laden sand up to at least 1,600 feet elevation.

"These giant landslides seem to occur during periods of higher than normal sea level--like we have now," says Gary McMurtry, the lead researcher. "They pose a hazard not just in Hawaii but at all big oceanic volcanoes worldwide."

"Obviously we have to figure out why they occur," says Gerard Fryer, a colleague of McMurtry. "That means more mapping and much more dating. But we are racing galloping development—the best exposure on Kohala has already been damaged by unauthorized bulldozing".

Research Article Citation:
Gary M. McMurtry, Gerard J. Fryer, David R. Tappin, Ian P. Wilkinson, Mark Williams, Jan Fietzke, Dieter Garbe-Schoenberg and Philip Watts, 2004, Megatsunami deposits on Kohala volcano, Hawaii, from flank collapse of Mauna Loa: Geology, v. 32, no. 9, p. 741-744.

For more information, contact

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Photos and maps at website:
http://www.soest.hawaii.edu/SOEST_News/PressReleases/Megatsunami/
9-3-2004
Article sent by Wayne Johnston

Alaska tsunami video

Elena Suleimani of the Geophysical Institute, University of Alaska Fairbanks, reports that the video "Ocean Fury: Tsunamis in Alaska" has been completed. The executive producers are Kurt Byers (Alaska Sea Grant), Elena Suleimani (Geophysical Institute, UAF), Roger Hansen (Geophysical Institute, UAF), and Scott Simmons (Alaska Division of Homeland Security and Emergency Management).

The video will be aired October 21 statewide on AlaskaOne Public Television. This video is available from the Alaska Sea Grant bookstore at http://www.uaf.edu/seagrant/Pubs_Videos/pubs/M-25.html.

Mega-scale events: Natural disasters and human behavior

A record of mega-scale geological events is preserved on the rocky planets and satellites. In the past, "catastrophic" events on Earth have caused only local collapses of social structure of civilizations. For example, compelling evidence indicates that earthquake storms caused the demise of the Bronze Age in the Aegean and eastern Mediterranean ~1225–1175 B.C. The manip-ulation of the Nile River by humans for ~7000 years has affected increasing areas of the Nile, and now, the Mediterranean Sea. In ~900 A.D., a shallow earthquake on the Seattle fault sent a tsunami throughout the Sound, burying Native American fire pits beneath sand swept ashore by the wave. Now, human population has increased so much, and our civilization has become so globally connected, that relatively "small" mega-scale events can have much more severe geo-logic, ecologic, and social conesquences than even a few hundred years ago. Today, over 3,000,000 people live and work in the Seattle area, and the same tsunami event could have a much larger effect locally, with economic repercussions from the devastation of this high-tech area spreading around the globe. We cannot tell which of, or when, the many possible geo-logic mega-scale events will occur, but we can easily diagnose that one mega-event is here: humans affecting the physical and biological state of planet on a massive, and dramatically rapid, scale. The globe fragility of our species is dramatically illustrated by the potential of the SARS epidemic of 2003. Without rapid detection, acknowledgement of the problem, aggressive monitoring, and treatment by organizations like the Centers for Disease Control (CDC), a catastrophic SARS pandemic might have occurred (and still may?). By analogy, we have already detected and defined many aspect of human behavior that are jeopardizing the planet. Unfortunately, we are reluctant to acknowledge our abuse of our water and soils, the consequences of our unfettered energy and mineral consumption, and our contempt for the rest of the ecosystem. If the

earth-science community could build a "CDC-for-planet Earth" to institute aggressive monitoring, identify and understand trends, predict their consequences, and suggest and evaluate alternative actions, we might yet be able to set the path to rescue ourselves and our ecosystem from that mega-scale terminal event called "extinction."♦

Abstract by Susan W. Kieffer, Paul Barton, A. R. Palmer, Pual H. Reitan, and E. Zen, 2003, Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 432.

PUBLICATIONS

Talking About Disaster: Guide for Standard Messages

The National Disaster Education Coalition (NDEC) has released the second edition of *Talking About Disaster: Guide for Standard Messages.* Developed to help organizations and agencies provide the American public with accurate, consistent, and appropriate messages regarding disaster preparedness and safety, the guide is the result of an extensive collaborative effort by more than 450 professionals, scientists, and researchers. It features standardized safety messages for 20 natural, technological, and human-induced hazards; includes statistics and explanations reinforcing the credibility of each message; and distinguishes disaster facts from disaster fiction.

The guide is a valuable resource for anyone involved in disaster education and communication, including emergency managers, homeland security professionals, meteorologists, educators, and the media. The information in the guide is in the public domain and may be freely distributed and tailored to fit specific needs. Download the guide for free at http://www.disastereducation.org/guide.html.
From: Natural Hazards Observer, v. 29, no. 1, p. 19, September 2004

Early Warning Systems for Natural Disasters

Jochen Zschau and Andreas N. Küppers, editors. ISBN 3-540-67962-6. 2003. 467 pp. $197.00. Available from Springer, 175 Fifth Avenue, New York, NY 10010; (800) 777-4643; e-mail: service@springer-ny.com; http://www.springeronline.com/.

Intended for decision makers in the political arena, scientists, engineers, and those responsible for public communication and dissemination of warnings, this book is a comprehensive account of early warning systems related to natural disasters. Disasters covered include tropical storms, floods, drought, El Niño, earthquakes, volcanoes, tsunamis, avalanche, and fire. Additional sections address technological hazards, the role of satellite techniques in early warning systems, special problems for developing countries and small island states, and future technology needs.
From: Natural Hazards Observer, v. 29, no. 1, p. 20, September 2004

Living With Risk: A Global Review of Disaster Reduction Initiatives

ISBN 92-1-101050-0. 2004. Vol. I: 454 pp., Vol. II (Annexes): 130 pp. $95.00 for both volumes. Available from the UN Inter-Agency Secretariat for the International Strategy for Disaster Reduction, Palais des Nations CH 1211, Geneva 10, Switzerland; +41 22 917 2762/2759; e-mail: isdr@un.org; http://www.unisdr.org/. Written for practitioners and anyone interested in disaster risk reduction, humanitarian action, and sustainable development, this 2004 edition features examples of action taken by individuals, communities, and governments around the world to avoid and reduce the risks and impacts of natural and technological hazards. It provides an overview of the evolution of the understanding of risk and disaster management; explores the concepts of risk and vulnerability; offers lessons on how to reduce risk and vulnerability to hazards; and discusses the importance of knowledge exchange and information management. Free online extracts are available at http://www.unisdr.org/eng/about_isdr/bd-lwr-2004-eng.htm.
From: Natural Hazards Observer, v. 29, no. 1, p. 20, September 2004

Introduction to Natural and Man-Made Disasters and Their Effects on Buildings

Roxanna McDonald. ISBN 0-7506-5670-0. 2003. 256 pp. $39.95. Available from Architectural Press, Elsevier Science/Harcourt, 200 Wheeler Road, 6th floor, Burlington, MA 01803; (781) 221-2212, (800) 545-2522; e-mail: usbkinfo@elsevier.com; http://www.architecturalpress.com/.

This is a comprehensive guide to natural and human-induced disasters and the effects they have on buildings. Written for anyone involved in building design and construction, it provides overall guidance and a basic technical understanding of disaster types and prevention, mitigation, and management of disaster.

From: Natural Hazards Observer, v. 29, no. 1, p. 20, September 2004

Hazards Watch: Reducing the Impacts of Disasters through Improved Earth Observations

Summary of a Workshop, October 22, 2003, Washington, DC. Richard Sylves and Helen Wood. 2004. 24 pp. Available free online from the National Academies Press, 500 Fifth Street, NW, Box 285, Washington, DC 20055; (202) 334-3313, (800) 624-6242; http://books.nap.edu/html/ndr/hazards_watch.pdf

Participants at the 9th Disasters Roundtable were tasked with exploring how we can use our ability to observe the Earth's natural systems to create a disaster-resilient society and the challenges and limits that remain in earth observation efforts. This report summarizes the workshop, stresses the value of Earth observing technologies in guiding policy and emergency management decisions regarding disaster prevention and mitigation, and discusses the importance of internationalizing the effort to better serve the planet as a whole.
From: Natural Hazards Observer, v. 29, no. 1, p. 21, September 2004

Mapping Vulnerability: Disasters, Development and People

Greg Bankoff, Gerog Frerks, and Dorthea Hilhorst, editors. ISBN 1-85383-964-7. 2004. 236 pp. $29.95. Available from Earthscan, 8-12 Camden High Street, London NW1 OJH, UK; +44 (0)20 7387 8558; e-mail: earthinfo@earthscan.co.uk; http://www.earthscan.co.uk/.

Hazards are natural, disasters are not. Social processes generally result in unequal exposure to risk by making some people more disaster-prone than others. This book explores aspects of vulnerability as key to understanding risk and the human response to hazards. Critical to this understanding is an appreciation of how human systems place people at risk in relation to each other and the environment—a relationship that can be best understood in terms of an individual, household, community, or societal vulnerability. These issues are examined through scholarly and case-study perspectives.
From: Natural Hazards Observer, v. 29, no. 1, p. 21, September 2004

WEBSITES

http://mtjune.uoregon.edu/website/hazardmaps/webapp/hazardsViewer_content.html

Oregon Partners for Disaster Resistance and Resilience has produced a regional hazard viewer to provide information about hazard risk throughout the state as part of Oregon's natural hazard mitigation plan.
From: Natural Hazards Observer, v. 29, no. 1, p. 16, September 2004

CONFERENCES

October 18–22, 2004

UN International Workshop on the Use of Space Technology for Disaster Management. This conference will bring together 120 decision-makers and senior experts to discuss the results of five regional workshops and build on those results to define a global strategy and develop global partnerships.
From: http://ioc.unesco.org/itsu/

October 25–27, 2004

17th Annual Emergency Preparedness Conference. Sponsors: Insurance Bureau of Canada, Public Safety and Emergency Preparedness Canada, University of British Columbia, City of Vancouver, and others. Vancouver, British Columbia.

The theme of this conference is an "Action Plan for the Future." Sessions will cover disaster resilient communities, climate change, the use of maps in emergency management, how insurance fits into the recovery process, and more.

Information is available from the Emergency Preparedness Conference, 900 Heatley Avenue, Vancouver, BC, V6A 3S7 Canada; (604) 665-6097; e-mail: info@epconference.ca; http://www.epconference.ca/.
From: Natural Hazards Observer, v. 28, no. 6, p. 14

November 4–5, 2004

2004 Annual IBHS Congress. Sponsor: Institute of Business and Home Safety (IBHS). Orlando, Florida. IBHS annual congress on property loss reduction brings together insurance professionals, emergency managers, government officials, and academics to discuss the latest developments in natural hazard mitigation.

Information is available from IBHS, 4775 East Fowler Avenue, Tampa, FL 33617; (813) 286-3400; e-mail: info@ibhs.org; http://www.ibhs.org/congress/.
From: Natural Hazards Observer, v. 28, no. 6, p. 14

November 5–11, 2004

IAEM 52nd Annual Conference. Sponsor: International Association of Emergency Managers (IAEM). Dallas, Texas. This forum on trends, topics, and the latest tools for emergency management and homeland security will encourage stakeholders to exchange ideas on collaborating to protect lives and property from disaster. For information, contact IAEM, 201 Park Washington Court, Falls Church, VA 22046; (703) 538-1795 x2; e-mail: info@iaem.com; http://www.iaem.com/.
From: Natural Hazards Observer, v. 29, no. 1, p. 14, September 2004

November 8–10, 2004

CPM 2004 East, "Expect the Unexpected…Are You Ready?", Marriott Wardman Park Hotel, Washington, DC. Sponsor: Continuity Planning & Management.
Register: www.ContinuityPlanningExpo.com

November 17–20, 2004

Emergency Response Conference and Exposition. Sponsors: Rotor and Wing, Access Intelligence. San Diego, California. Focus is on how emergency responders and organizations can integrate their response to major incidents and manage new activities. For information, contact Stephen Schuldenfrei, Access Intelligence, 1201 Seven Locks Road, Potomac, MD 20854; (301) 354-1813; e-mail: sschuldenfrei@accessintel.com; http://www.emergencyresponseshow.com/.
From: Natural Hazards Observer, v. 29, no. 1, September 2004, p. 15

November 18–20, 2004

1st Annual Canadian Risk and Hazard Network (CRHNet) Symposium. Sponsor: Canadian Risk and Hazards (Knowledge and Practice) Network. Winnipeg. This symposium will bring together an international group of scholars, researchers, and practitioners to share knowledge and exchange information to address risk through partnerships. It will also introduce CRHNet, a knowledge- and practice-based network to develop, promote, and help implement emergency management prevention and mitigation strategies in Canada. For information, contact Donna Parkhurst, First Canadian Risk and Hazards Symposium, Natural Resources Institute, University of Manitoba, 304 Sinnott Building, 70 Dysart Road, Winnipeg, MB R3T 2N2 Canada; (204) 474-8954; e-mail: info@crhnet.ca; http://www.crhnet.ca/index.php?pid=005.
From: Natural Hazards Observer, v. 29, no. 1, September 2004, p. 15

December 2–4, 2004

Hazards 2004. The Tenth International Symposium on Natural and Human-Induced Hazards and Third Workshop of the IUGG Commission on Geophysical Risk and Sustainability. Sponsor: National Geophysical Research Institute. Hyderabad, India. Topics covered will encompass the spectrum of natural and human-induced hazards, their causes, risks, and management. For information, contact Hazards 2004, National Geophysical Research Institute, Hyderabad-00007 India; 0091-40-23434700; e-mail: sec-loc@hazards2004.org; http://www.hazards2004.org/.
From: Natural Hazards Observer, v. 29, no. 1, September 2004, p. 15

December 13–17, 2004

Fall AGU Meeting OS10: Tsunami hazards and probabilistic analysis. One of several tsunami-related sessions in the American Geophysical Union Fall meeting
From: http://ioc.unesco.org/itsu/

January 18–22, 2005

World Conference on Disaster Reduction. Kobe, Hyogo, Japan. For more information, go to http://www.unisdr.org/eng/wcdr/wcdr-index.htm

March 7–10, 2005

Coastal GeoTools '05 is a conference series that focuses on the geospatial information needs of the nation's coastal programs. It's an opportunity for coastal managers to come together to share their challenges and successes in integrating spatial technologies with coastal resource management. Myrtle Beach, South Carolina. For more information: www.csc.noaa.gov/geotools

May 24–26, 2005

CPM 2005 West. The Mirage Hotel, Las Vegas, NV. Sponsor: Continuity Planning & Management.

May 24–26, 2005

The Tsunami Society (PO Box 1130, Honolulu, HI 96807) conducts a Tsunami Symposium every three years at the East-West Center on the University of Hawaii campus.

BOOK REVIEW

by Heidi Ellemor, Emergency Management Australia

Reprinted with permission, from *The Australian Journal of Emergency Management*, v. 19, no. 2, p. 30, May 2004

Methods of Disaster Research (R.A. Stallings, ed., 2002, International Research Committee on Disasters: U.S., 524 p.) is a much needed volume that will provide both new and experienced disaster researchers with insight into the particular challenges of conducting disaster research. The volume includes a refreshing combination of thoughtful commentary from some of the world's leading specialists in disaster research as well as researchers newer to the field. Importantly, it provides insight into key methodological challenges, as well as grounded advice on the implementation of the research process and particular research methods in the disaster context.

Methods of Disaster Research is borne of the breadth and depth of disaster research in the United States, with numbers of disaster researchers, levels of research funding and an institutional history of dedicated disaster research centres that differs markedly from the disaster research context in Australia. Despite, and perhaps because of these differences, the volume offers much of relevance for individual researchers and the collective field of disaster research in Australia.

The volume contains 16 chapters, divided into four sections. Following on from a thought provoking introductory chapter on the question of uniqueness and disaster research methods by Stallings, the first section considers the *context* of disaster research. This section includes a reprint (with new preface) of Killian's 1956 paper of surprising contemporary relevance "An introduction to methodological problems of field studies in disasters" and a chapter by Quarantelli on the development of the Disaster Research Centre and its role in field studies of organised behaviour in the crisis period of disasters. In the final chapter in this section, Drabek provides valuable insight to the opportunities posed by disaster research, and the art of posing interesting and problem-focused questions and implementing alternative research methods.

The second part of the volume (*continuities*), provides commentaries on particular research specialties and methods including survey research (Bourque, Shoaf and Nguyen), qualitative research methods (Phillips), the economics of natural disasters (Yezer), cross-national and comparative disaster research (Peacock), media studies (Lombardi) and historical approaches to disaster research (Scanlon).

Particular challenges and *prospects* for the field are contained in Part 3 of the volume through discussions of electronic media and the globalisation of data collection (Dombrowsky), the use of geographic information systems in disaster research (Dash), disaster research issues in the developing world (Khondker) and a consideration of social change and the practice of disaster fieldwork (Tierney). Part 4 (*postscript*) rounds off the volume with reflections on the role of public-private partnerships in disaster research (Davidson). The *appendix* (Part 5) contains a useful annotated index of internet resources compiled by Butler that will prove useful at least in the shorter term.

Above all, Drabek's statements about disaster research methods for the future stand out—that is to always start with an interesting and problem focused question; to select or develop methods required to pursue the question posed, and to "always keep in mind the real promise of disaster research—to prevent or ameliorate human suffering" (p. 153). As he notes, research is fundamental in developing new theories and testing and revising old notions, [b]ut insights for practitioners must also be produced as we join other disciplines in the professionalisation of emergency management" (p. 153). Importantly, this theme is emphasized throughout the volume, for example in Tierney's (chapter 15) discussion of recent trends towards better integration of research and practice and Khondker's (chapter 14) emphasis on the ongoing and parallel importance of education and research in the training of disaster professionals.

Overall, this is an important volume. Whilst providing useful advice on the application of disaster research methods, *Methods of Disaster Research* offers thoughtful commentary on trends in disaster research and disaster management more generally. It is a volume that will be of much interest to new and established researchers and it will prove useful in the professsional training of disaster managers. ♦

Material added to the National Tsunami Hazard Mitigation Program Library
September–October 2004

Alaska Division of Emergency Services [and others], 2002, Alaska Emergency Management Conference, April 15–19, 2002: Alaska Division of Emergency Services [and others], 1 CD.

Atwater, Brian F.; Satake, Kenji, 2003, The 1700 Cascadia tsunami initiated a fatal shipwreck in Japan [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 478.

Barberopoulou, Aggeliki; Qamar, Anthony; Pratt, Thomas L.; Creager, Kenneth; Steele, William; Mofjeld, Harold, 2003, Local amplification of seismic waves from the Mw7.9 Alaska earthquake and damaging water waves in Lake Union, Seattle, Washington [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 646.

Barnett, Stephen F.; Ettensohn, Frank R., 2003, A possible middle Devonian tsunamite—Duffin bed, New Albany shale of south-central Kentucky [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 602.

Coastal Services, 2004, Tsunami!—Preparing Hawaii for the next big wave: Coastal Services, v. 6, no. 5, p. 4-5, 9.

Higman, Bretwood M., 2003, Normal grading patterns in deposits of the 1992 Nicaragua tsunami [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 602.

Kamataki, Takanobu; Fujiwara, Osamu, 2003, Sedimentary structures and molluscan assemblages within a tsunami deposits from Holocene bay sediments in the Boso Peninsula, Central Japan [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 583.

Keating, Barbara H., 2003, Mega-tsunami mega-controversy [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 576.

National Disaster Education Coalition, 2004, Talking about disaster--Guide for standard messages: National Disaster Education Coalition, 1 v.

Peters, Robert B.; Jaffe, Bruce E.; Gelfenbaum, Guy; Rubin, David M.; Anima, Roberto; Swensson, Matt; Olcese, Daniel; Anticona, Luis Bernales; Gomez, Juan Carlos; Riega, Percy Colque, 2003, Sedimentary deposits from the 2001 Peru tsunami [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 602.

Salgado, Ignacio; Eipert, Annaliese; Atwater, Brian; Shishikura, Masanobu; Cisternas, Marco, 2003, Recurrence of giant earthquakes inferred from tsunami sand sheets and subsided soils in south-central Chile [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 584.

Shipley, K. W.; Aschoff, J. L.; Lawton, T. F.; Giles, K. A.; Vega, F. J., 2003, Sedimentologic and petrographic analysis of upper Cretaceous impact-related deposits, La Popa Basin, northeastern Mexico [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 602-603.

Stewart, Kevin G., 2003, Forcefully injected clastic dikes and sills associated with the K/T impact tsunami [abstract]: Geological Society of America Abstracts with Programs, v. 35, no. 6, p. 602.

Walsh, Timothy J.; Titov, Vasily V.; Venturato, Angie J.; Mofjeld, Harold O.; Gonzalez, Frank I., 2004, Tsunami hazard map of the Bellingham area, Washington—Modeled tsunami inundation from a Cascadia subduction zone earthquake: Washington Division of Geology and Earth Resources Open File Report 2004-15, 1 sheet, scale 1:50,000. ♦

Note: These, and all our tsunami materials, are included in our online (searchable) catalog at http://www.dnr.wa.gov/geology/washbib.htm

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The Shoreline Problem

Even with full deployment of deep ocean tsunami detection and real-time reporting systems, we will not have a perfect warning capability. We still need to learn more about how tsunamis behave when they strike a coast. Some scientists consider the problem of predicting how tsunami waves interact with the shoreline to be more difficult to solve than that of the generation and propagation of tsunamis across the ocean. Two factors must be considered when trying to estimate how a tsunami will react at the shore. First the size of the tsunami on the high seas must be known. Once deep ocean detection systems are in place, we will have largely solved this problem. The second problem is how the tsunami will respond to the shore. This problem includes any seiche effects produced in bays, in harbors, or on the continental shelf, plus the run-up effects as the tsunami waves actually climb up the shoreline. The combined impact of run-up and seiche effects can increase the size of the tsunami waves anywhere from 10 to as much as 100 times. A tsunami measuring 4 inches on the high seas could become a modest 3-foot wave in one area and a 30-foot monster in another, depending on how it interacts with with shore.

From: Dudley, Walter C.; Lee, Min, 1998, Tsunami!; 2nd. ed.: University of Hawai'i Press, p. 325-326.

VIDEO RESERVATIONS

To reserve tsunami videos (VHS), contact TsuInfo Alert Video Reservations, Lee Walkling, Division of Geology and Earth Resources Library, PO Box 47007, Olympia, WA 98504-7007; or e-mail lee.walkling@wadnr.gov

Business Survival Kit for Earth Quakes & Other Disasters; What every business should know before disaster strikes. Global Net Productions for the Cascadia Regional Earthquake Work-group, 2003. 27 min. With CD disaster planning tool-kit and other information.

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.

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

Tsunami Evacuation PSA; 2000. 30 sec. DIS Interactive Technologies for Washington Emergency Management Division.

Cascadia: The Hidden Fire–An Earthquake Survival Guide. 2001. 9.5 min. Global Net Productions. A promo for a documentary about the Cascadia subduction zone and the preparedness its existence demands of Alaska, Oregon and Washington. Includes mention of tsunamis.

Not Business as Usual: Emergency Planning for Small Businesses, sponsored by CREW (Cascadia Regional Earthquake Workgroup), 2001. 10 min. 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 manual for emergency preparedness for businesses.

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.

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

Disasters are Preventable. 22 min. Preparedness measures to reduce losses from various kinds of disasters.

Disaster Mitigation Campaign. 15 min. American Red Cross; 2000. TV spots about hurricanes, high winds, floods, earthquakes.

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.

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.)

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

Protecting Our Kids from Disasters. 15 min. Good instructions to help parents and volunteers make effective but low-cost, non-structural changes to child care facilities, in preparation for natural disasters. With an 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 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.

NEW!! Run to high ground. 2004. Global Net Productions, Washington Military Department Emergency Management Division; Provincial Emergency Program of British Columbia. Features Hoh storyteller Viola Riebe and a Pacific Northwest tale of an earthquake and tsunami. **(The Library also has a DVD copy of this program.)**

Tsunami and Earthquake Video. 60 min. Includes "Tsunami: How Occur, How Protect," "Learning from Earthquakes," and "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.

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 about 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, Washington Interpretive Center, this video deals with beach safety, including tsunamis.♦

Ship-sinking monster waves revealed by ESA satellites

European Space Agency, 21 July 2004
Reprinted with permission.
From: http://www.esa.int/export/esaCP/SEMOKQL26WD_Protecting_0.html

Once dismissed as a nautical myth, freakish ocean waves that rise as tall as ten-storey apartment blocks have been accepted as a leading cause of large ship sinkings. Results from ESA's ERS satellites helped establish the widespread existence of these 'rogue' waves and are now being used to study their origins.

Severe weather has sunk more than 200 supertankers and container ships exceeding 200 metres in length during the last two decades. Rogue waves are believed to be the major cause in many such cases. Mariners who survived similar encounters have had remarkable stories to tell. In February 1995 the cruiser liner Queen Elizabeth II met a 29-metre high rogue wave during a hurricane in the North Atlantic that Captain Ronald Warwick described as "a great wall of water… it looked as if we were going into the White Cliffs of Dover."

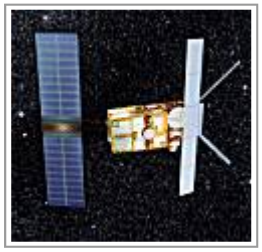
And within the week between February and March 2001 two hardened tourist cruisers—the Bremen and the Caledonian Star—had their bridge windows smashed by 30-metre rogue waves in the South Atlantic, the former ship left drifting without navigation or propulsion for a period of two hours.

Damage done by a rogue wave

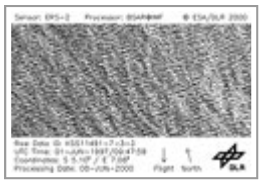
"The incidents occurred less than a thousand kilometres apart from each other," said Wolfgang Rosenthal - Senior Scientist with the GKSS Forschungszentrum GmbH research centre, located in Geesthacht in Germany - who has studied rogue waves for years. "All the electronics were switched off on the Bremen as they drifted parallel to the waves, and until they were turned on again the crew were thinking it could have been their last day alive. "The same phenomenon could have sunk many less lucky vessels: two large ships sink every week on average, but the cause is never studied to the same detail as an air crash. It simply gets put down to 'bad weather'." Offshore platforms have also been struck: on 1 January 1995 the Draupner oil rig in the North Sea was hit by a wave whose height was measured by an onboard laser device at 26 metres, with the highest waves around it reaching 12 metres.


Giant wave in Bay of Biscay

Objective radar evidence from this and other platforms—radar data from the North Sea's Goma oilfield recorded 466 rogue wave encounters in 12 years—helped convert previously sceptical scientists, whose statistics showed such large deviations from the surrounding sea state should occur only once every 10000 years. The fact that rogue waves actually take place relatively frequently had major safety and economic implications, since current ships and offshore platforms are built to withstand maximum wave heights of only 15 metres.
In December 2000 the European Union initiated a scientific project called MaxWave to confirm the widespread occurrence of rogue waves, model how they occur and consider their implications for ship and offshore structure design criteria. And as part of MaxWave, data from ESA's ERS radar satellites were first used to carry out a global rogue wave census.


ERS satellite

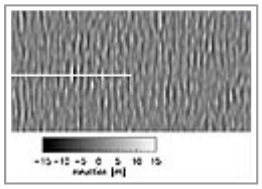
"Without aerial coverage from radar sensors we had no chance of finding anything," added Rosenthal, who headed the three-year MaxWave project. "All we had to go on was radar data collected from oil platforms. So we were interested in using ERS from the start." ESA's twin spacecraft ERS-1 and 2—launched in July 1991 and April 1995 respectively—both have a Synthetic Aperture Radar (SAR) as their main instrument. The SAR works in several different modes; while over the ocean it works in wave mode, acquiring 10 by 5 km 'imagettes' of the sea surface every 200 km.



Example of an imagette from ERS-2

These small imagettes are then mathematically transformed into averaged-out breakdowns of wave energy and direction, called ocean-wave spectra. ESA makes these spectra publicly available; they are useful for weather centres to improve the accuracy of their sea forecast models. "The raw imagettes are not made available, but with their resolution of ten metres we believed they contained a wealth of useful information by themselves," said Rosenthal. "Ocean wave spectra provide mean sea state data but imagettes depict the individual wave heights including the extremes we were interested in.

"ESA provided us with three weeks' worth of data—around 30,000 separate imagettes—selected around the time that the Bremen and Caledonian Star were struck. The images were processed and automatically searched for extreme waves at the German Aerospace Centre (DLR)."



Giant wave detected in ERS-2 imagette data

Despite the relatively brief length of time the data covered, the MaxWave team identified more than ten individual giant waves around the globe above 25 metres in height. "Having proved they existed, in higher numbers than anyone expected, the next step is to analyse if they can be forecasted," Rosenthal added. "MaxWave formally concluded at the end of last year although two lines of work are carrying on from it—one is to improve ship design by learning how ships are sunk, and the other is to examine more satellite data with a view to analysing if forecasting is possible." A new research project called WaveAtlas will use two years worth of ERS imagettes to create a worldwide atlas of rogue wave events and carry out statistical analyses. The Principal Investigator is Susanne Lehner, Associate Professor in the Division of Applied Marine Physics at the University of Miami, who also worked on MaxWave while at DLR, with Rosental a co-investigator on the project.

"Looking through the imagettes ends up feeling like flying, because you can follow the sea state along the track of the satellite," Lehner said. "Other features like ice floes, oil slicks and ships are also visible on them, and so there's interest in using them for additional fields of study.

"Only radar satellites can provide the truly global data sampling needed for statistical analysis of the oceans, because they can see through clouds and darkness, unlike their optical counterparts. In stormy weather, radar images are thus the only relevant information available."So far some patterns have already been found. Rogue waves are often associated with sites where ordinary waves encounter ocean currents and eddies. The strength of the current concentrates the wave energy, forming larger waves – Lehner compares it to an optical lens, concentrating energy in a small area.

Giant wave in a wave tank

This is especially true in the case of the notoriously dangerous Agulhas current off the east coast of South Africa, but rogue wave associations are also found with other currents such as the Gulf Stream in the North Atlantic, interacting with waves coming down from the Labrador Sea.

However the data show rogue waves also occur well away from currents, often occurring in the vicinity of weather fronts and lows. Sustained winds from long-lived storms exceeding 12 hours may enlarge waves moving at an optimum speed in sync with the wind—too quickly and they'd move ahead of the storm and dissipate, too slowly and they would fall behind. "We know some of the reasons for the rogue waves, but we do not know them all," Rosenthal concluded. The WaveAtlas project is scheduled to continue until the first quarter of 2005. ♦

From: http://www.esa.int/esaCP/SEMOKQL26WD_index_0.html (July 29, 2004)

Accounts of tsunami extend back almost 4,000 years in China, 2,000 years in the Mediterranean—where the first tsunami was described in 479 B.C.—and about 1,300 years in Japan. However, many important tsunamigenic regions have much shorter documentation. For example, the Chile-Peru coastline, which is an important source of Pacific-wide tsunami, has records going back only 400 years to 1562, while those for Alaska have only been documented since 1788. Tsunami records in Hawaii, which is a sentinel for events in the Pacific Ocean, exist only from 1813 onwards. Few records exist along the West Coast of Canada and the contiguous United States. The Southwest Pacific Ocean records are sporadic and almost anecdotal in reliability. Only in the last ten years have records been compiled from Australia and New Zealand, with historical documentation extending back no further than 150 years.

From: Bryant, Edward, 2001, Tsunami—The Underrated Hazards: Cambridge University Press, p. 15.

Infrequently asked questions
compiled by Lee Walkling

What do the Monongahela, the Susquehanna, the De Soto, and the La Plata have in common?

All three ships experienced the November 18, 1867 Virgin Island earthquake and tsunami.

"Report from the Flagship Susquehanna, 2:30 pm:

20' waves entered the harbor 10 minutes after the quake hit, sinking a small steamer and sailing vessel. Vessels at anchor were lifted from their moorings and carried onto the rocks. The De Soto was hit broadside and carried from her mooring, both chains snapping, thrown against a new wharf, then swept back into deep water. The Susquehanna met 3 waves in succession head on. Small craft inshore were lifted up, thrown into streets and left stranded along the water front. Boats were capsized with men in the water swimming for their lives. The bay subsided into sort of a whirlpool.

Report from the De Soto, Island of St Thomas, 2:50 pm:

Immediately after the quake, water rushed out of the harbor with great violence, returning as a 23' wave. There were 4 waves, the last only 12-15". During the event, the ship swung around all points of the compass not less than 20 times.

Report from the La Plata, 2:30 pm:

Hit by 2 immense waves, the 2nd carrying off 2-3 boats.

Report from the Monongahela, on the west coast in Frederiksted, 3:00 pm:

Immediately after the quake harbor water receded rapidly from the beach, then the current changed immediately and drove the ship toward the beach. Reflux of the wave kept her in water deep enough to float, but the sea returned in a 25-30' wave and carried her over the warehouse into the first street fronting the bay. The reflux of this wave left her on a coral reef. All happened in 3 minutes. She was eventually floated off the reef."

From: http://www.erh.noaa.gov/er/phi/reports/tsunami.htm. This page was composed by Harry G. Woodworth.

According to Alvion P. Mosier, was a tsunami involved in the "greatest sea disaster in peacetime that the Navy ever suffered?"

Yes. "According to crew member Alvion P Mosier, the loss of the *Memphis* was the greatest sea disaster in peacetime that the Navy had ever suffered. The *Memphis* was in Santo Domingo to support the Marines stationed there, and was the flagship to senior officer Admiral Pond. The ship's commanding officer was Captain Edward J Beach. San Domingo harbor was a very exposed anchorage, open to the S and E. *Memphis* and the gunboat *Castine* were anchored in 55' of water. On this Tuesday morning, the Admiral and 2 aides went ashore and were met by the US Consul. At 1 pm the cruiser put ashore a recreation party, which went ½ mile upstream in the Ozama River, where the Marines were billeted at Fort Ozama. Shortly after, one of the *Memphis*' dinghies capsized, and it was noticed when raising it the ship was rolling more than usual, but there was no wind. Rolling became very heavy, and the Captain looked seaward and saw to his horror an immense wave about 70' high approaching the harbor fast and obscuring the horizon. It was now 345 pm.

The swell became enormous, washing over her, and with her keel occasionally touching the seabed, waves now estimated at 40'. The large wave had slowed. It was carrying before it a huge area of sand and mud, and the nearer it approached, the more the swell increased. The launch sent to pick up the recreation party emerged from the Ozama, pitching then capsizing. The *Castine* could not lower boats to the sailors in the water, but threw life belts and other objects in the water to help the men. She had built up enough steam to reach deeper water and lower swells, but the *Memphis* had not. The *Memphis* continued to roll, as much as 70 degrees, with the crew to their astonishment witnessing green seas descending into the funnels. When the enormous wave reached her, she was beam on to the wave.

A trough appeared about 100 yards ahead of the wave, slowing as the crest of the wave built up, curving over the horrified onlookers, the peak about 50' above the bridge, itself 40' above the water line. It was in the form of 3 gigantic steps, each with a large plateau atop it, the whole now rushing shoreward at colossal speed. With a roar like an express train, the wave broke over the *Memphis.* She ended up onshore, after having been grounded several times on the razor-sharp coral bottom, once with the ship's port side aground, the 18,000 ton ship thrown onto her beam ends. The ship was a total wreck, and 40 lives were lost. She was to wait on the rocks for 21 years for the arrival of the ship breakers.

Many decades later in the submarine age, the USS "Triton" circumnavigated the globe, submerged, in 88 days, following the course Magellan made over 400 years ago. When the sub returned to New London, CT, it was flying the flag of the *Memphis*. The commander of the Triton was Captain Edward J. Beach, Jr."♦

http://www.compass.dircon.co.uk/Memphis.htm http://www.delmars.com/family/mosier2.htm
http://www.army.mil/cmh-pg/mohint4.htm http://www.navsource.org/archives/features/corwith/corwith3.htm
http://navsource.org/archives/04/acr10.htm http://www.history.navy.mil/medals/domin.htm

From: http://www.erh.noaa.gov/er/phi/reports/tsunami.htm. This page was composed by Harry G. Woodworth. harry.woodworth@noaa.gov

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