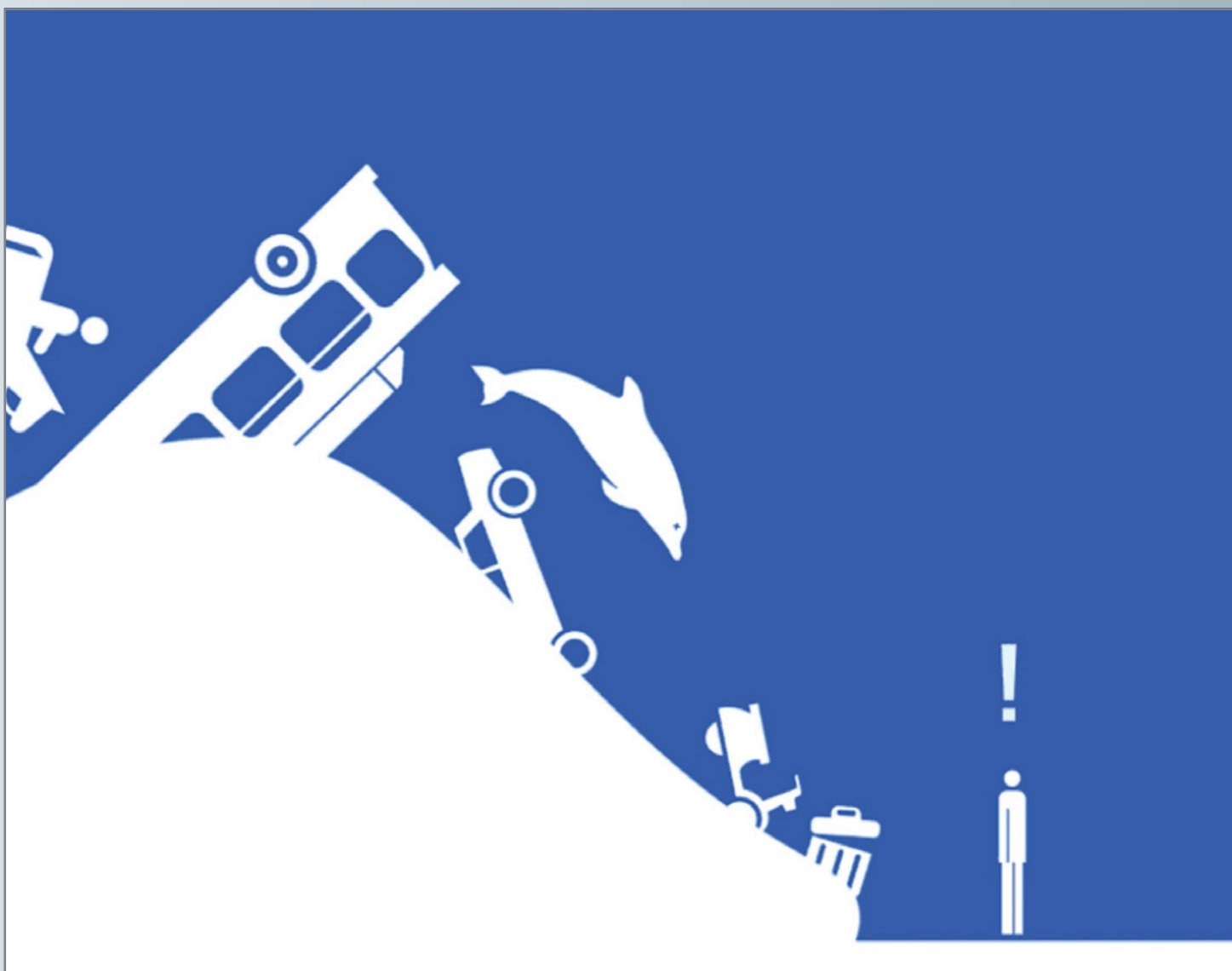


Communication Products for the Science Application for Risk Reduction (SAFRR) Tsunami Scenario



Open-File Report 2013–1170–K
California Geological Survey Special Report 229

COVER: Image from the prototype mobile device game app, "Splash," developed by students at Art Center College of Design game. A player can only survive and win "Splash" by running uphill and away from the tsunami.

The SAFRR (Science Application for Risk Reduction) Tsunami Scenario

Stephanie Ross and Lucile Jones, Editors

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By Suzanne Perry

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Product Development Overview

Science Application for Risk Reduction (SAFRR), like its predecessor the Multi-Hazards Demonstration Project, has a mission to increase the use of science by decision-makers of all kinds. Thus, an important part of any SAFRR scenario is development of products that enhance usability of the science. In this tsunami scenario, the focus has been on development of three kinds of products:

- products that augment typical outputs of scientific studies, such as reports, to make the results of the scenario more relevant and usable to nonscientists;
- products that distill local impacts and allow users in specific locales to identify which aspects of the broad regional study apply to their local area; and
- products that effectively deliver disaster preparedness messaging to one group of people who are not usually interested in disaster preparedness—those ages 18 to 34.

Products that Augment Typical Outputs

A motion graphics animation movie, 4 to 5 minutes in length, will be created by a professional artist or designer to summarize the principal scenario results. This movie is scheduled for production in late 2013, when all project research has been completed. Similar movies were created previously for the ShakeOut and ARkStorm scenarios. Figure 1 shows a frame from the movie “Preparedness Now” (2008, <http://www.youtube.com/watch?v=opXZY1zZ8xk>). In 4 minutes, that movie summarizes the key results of the ShakeOut scenario and basic earthquake mitigation practices. The movie has had multiple uploads to YouTube, with nearly 200,000 hits overall, and has been adapted several times for use in ShakeOut drills around the United States. It has been shown a very large but uncounted number of times to raptly attentive audiences in high school and college classrooms, as well as in meetings with local governments and communities. In addition, as part of the final report for the current scenario, we intend to develop an infographic-style timeline to communicate what happens from the time the tsunami is generated until the last of the damage is restored, to indicate the events, decisions, and uncertainties that arise as the disaster unfolds.

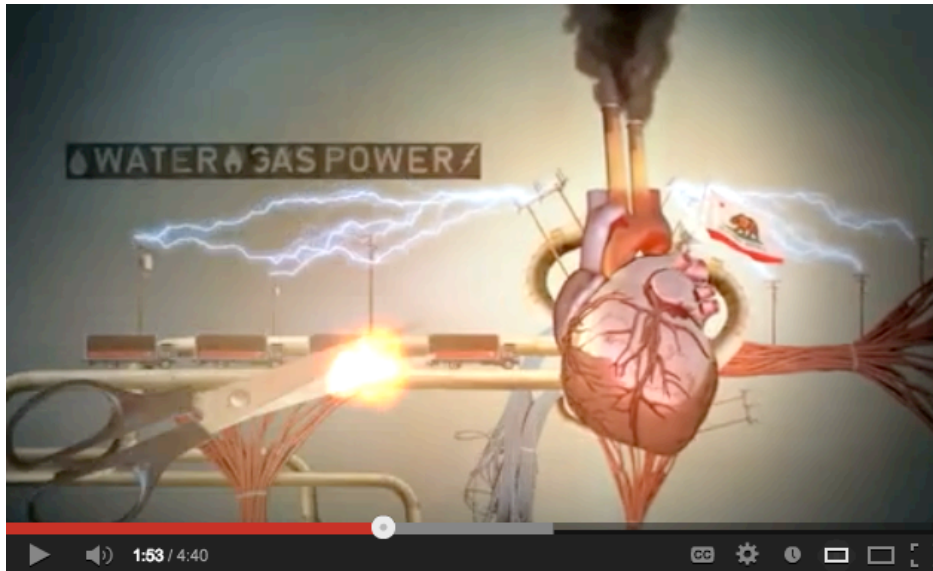


Figure 1. A still frame from the motion graphics movie “Preparedness Now,” metaphorically visualizing lifeline disruption caused by the ShakeOut scenario earthquake.

Products that Distill Local Impacts from the Regional Study

In previous SAFRR scenarios, this author has worked closely with local governments to develop additional documents that extract the parts of the larger regional study applicable to their locales and, where necessary, make reasonable extrapolations from the study. For this scenario, we intend to develop an interactive, map-based Web product that allows users to select a location and see which scenario datasets and results pertain to that location. Over time, we intend to extend this product to include results from previous scenarios.

Products that Deliver Effective Tsunami Messaging

The existence of the scenario helps to shine a spotlight on tsunami issues more generally. It also provides an opportunity to experiment with novel methods of communicating tsunami safety in ways that may be outside the scope of ongoing preparedness programs with fixed budget and purview. During the 2 years of scenario development, we polled and compiled experience from a large number of emergency managers, first responders, tsunami educators, and coordinators of this scenario, as well as reviewing existing products—especially the brochure “How to Survive a Tsunami” (California Emergency Management Agency, 2009)—and tsunami eyewitness accounts and newspaper reports. This effort was made to identify aspects of tsunamis and tsunami safety that are misunderstood in ways that compromise public safety. Table 1 contains the compiled list of important aspects of tsunamis where dangerous misunderstanding is common. It represents the results of the gathered experience and in particular was shaped by the repeated input of Tsunami Program leads Kevin Miller and Kate Long of the California Emergency Management Agency (now the California Governor’s Office of Emergency Services, or Cal OES), Earthquake/Tsunami/Volcano Program Manager John Schelling of the State of Washington, and psychology Ph.D. candidate Katherine Thompson of the Center for Research on Environmental Decisions, Columbia University.

The compilation in table 1 served as the foundation of a project to create prototype tsunami education materials that are engaging, entertaining, and compelling as well as informative. Another important guide in development of materials was the summary of pertinent findings from social and behavioral sciences (table 2). The materials produced are targeted to reach 18–34-year-olds, an audience that has been difficult to engage through traditional preparedness messaging (for example, Federal Emergency Management Agency, 2009; Hawai'i Disaster Preparedness, 2012; Partnership for a Healthy Durham, 2012). One of the materials, a short animated movie, is being developed with the additional intent that the movie will serve as a “calling card” to the hospitality industry. The intent is that the movie, by demonstrating that tsunami information products can be positive, enjoyable, and nonthreatening as well as informative, will increase the hospitality industry’s willingness to discuss broader distribution of tsunami information for hotel guests and staff.

After this movie is completed, Liesel Ritchie at the University of Colorado, Boulder, will conduct an evaluation. The purpose of the evaluation study is to ascertain what information the movie successfully conveyed and whether the intended tsunami information is conveyed to and retained by people 18 to 34 years old.

For this scenario's messaging products, we collaborated with the Designmatters program at Art Center College of Design in Pasadena, California, one of the premier schools in the Nation for marketers, advertisers, graphic designers, and product designers. Designmatters is unique in the Nation and perhaps the world because its students conduct research and class practicum projects in which they apply their creativity, skills, and expertise to social causes. The Designmatters approach is to educate while entertaining and to attract attention to serious issues using methods that may be lighthearted and fun. For each of its scenarios, SAFRR has had a Designmatters class focus on scenario issues. The movie “Preparedness Now” (fig. 1) was the result of one such class.

For the tsunami scenario, a Designmatters class developed prototypes for a tsunami education and awareness campaign after close interaction with SAFRR scenario coordinators and partners. They instructed the class in the basics of tsunami science, described the National Oceanic and Atmospheric Administration (NOAA) system of official warnings, and provided insights from sociology, psychology, and anthropology (table 2) about how to motivate action and how to communicate about rare events with large uncertainties of occurrence (see, for example, Wood and others, 2011; Shome and Marx, 2009).

Table 1 summarizes those tsunami concepts that are poorly understood, with reduced public safety as a consequence. These concepts form the basis of an awareness campaign that includes a suite of short animated movies in planning and development by Art Center College of Design.

Table 1. Tsunami concepts that are not well understood by the public, with consequently reduced public safety.

-
1. A tsunami is a kind of wave but not the typical ocean wave we know. A tsunami:
 - often looks like a wall of water;
 - sometimes looks like a fast-rising flood;
 - has multiple surges of waves.
 - Each wave keeps flowing in for many minutes.
 - Waves can keep coming for 24 hours or longer.
 - Waves will vary in height.
 - Big waves can arrive after smaller ones and a large, dangerous wave could come at any time—at the beginning, middle, or end of the tsunami.
 - Even when the water looks calm or shallow, it can be deadly dangerous with powerful, unpredictable currents and whirlpools.
 2. Sometimes you will know a tsunami is coming because you hear a warning from an official source like an announcement on television or a lifeguard with a bullhorn. (Official sources include loudspeaker, siren, lifeguard, television, Internet, radio, automated phone call, and door to door visit by hotel staff or police.)
 3. Often you will have to rely on yourself to recognize signs that a tsunami is coming:
 - if you feel earthquake shaking while you are on a beach
 - if you see the water pull away from shore like a very sudden, very low tide
 - if you see a wall of water coming toward shore
 - if you hear a sound like a freight train coming from the water
 - ... a tsunami could be coming. Get to higher ground immediately.
 4. Many people, if they see, hear, or feel a tsunami warning sign, won't take action immediately
 - Instead they will look around, see what other people are doing, wait and see what happens next.
 - But with a tsunami, every minute can be critical. So take action immediately with the first sign, even if you aren't certain it means "tsunami."
 - Don't wait for a second sign. You can't outrun a tsunami.
 5. To protect yourself and your loved ones in a tsunami:
 - get to higher ground and get away from the water
 - tsunamis move with incredible force but they can't go far uphill and they eventually lose power as they move over land
 - if you can't get to higher ground, as a last resort go high up in a tall, sturdy building but ONLY do this as a last resort.
 6. Get away from the water, not just the beach.
 - Tsunamis come into rivers, bays, marinas, and harbors too
 7. Stay away from the water until officials say it is okay to return (because of all the properties of tsunamis in point 1).
 8. NEVER move closer to the water to watch the tsunami (because of all the properties of tsunamis in point 1).
 9. Never try to surf a tsunami (because of all the properties in point 1).
 10. Possible Topics for Additional Modules:
 - Tsunami facts and earth science

- Social science about human behavioral response to tsunami signs and warnings
- What to do if there is no higher ground (vertical evacuation)
- How to know where the safe zones are (note: will address overevacuation issues)
- Why you can't surf a tsunami and it can be deadly to try
- Tsunami currents—tsunamis in harbors
- Where to get more information
- Real life examples of survival and death by following or not following these guidelines

To guide development of the messaging movie, Thompson of CRED and Perry of USGS provided the Art Center class with a summary of precepts from the social and behavioral sciences that are relevant to tsunami messaging. Table 2 presents this summary.

Table 2. Results from social and behavioral sciences pertinent to tsunami messaging.

-
- **In many ways, motivating people to pay attention to tsunami safety is the same as motivating them to watch a commercial.** However, there are important differences because of the way people deal with rare dangers.
 - **In our culture, people are reluctant to take action (like fleeing a beach) if nobody else is taking action.** There are two effective ways to confront this. Point out that this will be their likely reaction; and apply “monkey see, monkey do”—show others taking the desired action.
 - **It is very hard for people to imagine themselves in rare situations, so just saying “remember these warning signs” won't work.** People won't internalize or remember the information because they do not believe it will ever apply to them. People ignore messages that they think don't pertain to them. Best strategy is to acknowledge their feeling that this is not going to happen. You want to give the sense that a tsunami is rare but is going to happen to someone, and if you listen to this message, then you will be ready if you are the one.
 - **Connect *what* you want people to do with *why* they should do it.** Don't just give orders or instructions. The *why* needs to tap the emotions and values that are most important to people. In this context, the keys are control (*there is an action I can take*), survival (*if I do this I will be safe*), confidence (*I can protect people who matter to me*), and peace of mind (*by watching this movie, I am taking the right step*).
 - **Don't show misconceptions,** because that reinforces the misconception. People will remember that they saw something but not remember that what they saw was wrong. Only show what is true, not a myth or misunderstanding. If you need to show the wrong kind of wave (*“most people think a tsunami is like a common ocean wave”*), best to show a wave that is clearly not real, such as the famous old Japanese painting of a tsunami.
 - **Repetition of the message helps.** The repetition can be with visuals or words or both. For example, it will help cement the message “*get to higher ground*” if multiple people are seen doing this, and in different situations—such as moving uphill from a beach, and from a river, and from a harbor.

- **The visuals and the narration don't have to be identical.** Messages, emotions, and values can be conveyed using graphics or words. For example, the graphics can show the characteristics of a tsunami wave—you don't need to list them all.
 - **Don't try to catch attention by being too vivid, hyperbolic, or scary.** This will only cause backlash, and people will tune out the message. Everyone has a different threshold for what is too vivid. For most people it should be okay to hear “because he went down to watch the tsunami, he died” but not to watch the victim struggling and drowning.
 - **Most people are motivated to act if it will improve their situation and they respond to messages framed in a positive way.** *Do this to be safe... Do this to protect your loved ones... Here is what to do to be protected.* In such a short movie, there may only be time for a single approach, and if that is the case, use this kind of positive wording.
 - **However, not everyone is reached by this positive approach.** A large minority of people are instead motivated to act to avoid things getting worse. Those people instead need to hear *If you don't do this you could get hurt...* or *If you return to the beach you will get hurt.*
 - **A single example is more persuasive than saying “this affects many people.”** That is why journalists focus on one individual within a big story. Charities get more donations if they show a single starving orphan in Africa—with personal details about that orphan—than if they show an entire group of kids in Africa who all need help. If possible, it would be good to add some examples of what happened to particular individuals in particular tsunamis.
-

Prototype products of the Art Center campaign include:

- **Twitter feeds** from identities created for two NOAA dart buoys, one a crabby old buoy that complains a lot, the other an enthusiastic young buoy. The buoys will occasionally dispense tsunami science and safety information and issue warnings and advisories, but will gain followers because of the jokes, wisecracks, and entertaining tweets they make the rest of the time.
- “Splash,” a simple, chase style **game app for mobile devices**, in which a tsunami chases a cartoon icon representing the player (fig. 2). The player can only win the game by avoiding the tsunami, that is, by running to higher ground and away from the water. Those playing the game learn correct response to a tsunami, probably without realizing that they have just been educated about getting to higher ground.

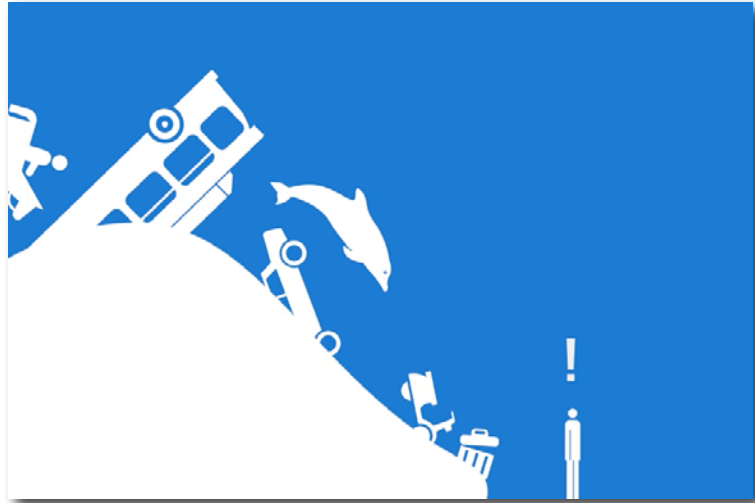


Figure 2. A still frame from the proposed tsunami game app “Splash.” The player can only survive and win the game by running uphill and away from the water.

Public billboards, posters, advertisements on buses, t-shirts, tote bags, temporarily erected statues, Web pages, and more are the pieces of an awareness campaign called “The Next Wave: Know the Tsunami (Empower Yourself).” The campaign focuses on educating people about safe and unsafe areas in their community in the event of a tsunami. It culminates in a day of public events, which include a triathlon and an Internet-connected treasure hunt called a geocache (fig. 3), a hunt that leads participants from a beach to areas that are safe from tsunami inundation and that delivers players to a music festival finale. Along their way, participants pass walls painted in temporary chalk to indicate areas that would be underwater in a tsunami.



Figure 3. Photograph showing street setup for part of the geocache event, during the proposed public awareness campaign called “The Next Wave.”

The logo for this campaign (fig. 4) uses symbols common in tsunami inundation and evacuation signs around the world (fig. 5). The background is red, rather than the blue of the tsunami signage, to make clear that this campaign is related to but separate from those signs and to emphasize the urgency in increased awareness and danger in tsunamis. The “V” in the word Wave has a second arm that is higher than the first, a subtle reminder to move to higher ground during a tsunami.



Figure 4. Logo for the tsunami public awareness campaign, in two color schemes



Figure 5. For comparison, this photograph shows a sample tsunami evacuation route sign in Thailand.

The campaign uses two visual languages. One is a beautiful, serene ocean image (fig. 6) to impart a sense of familiarity and safety. The other is a collection of cartoon pictograms (fig. 7), to instill a sense of community and fun.



Figure 1 **Figure 6.** Photograph showing a bus-stop billboard in one visual language (using a serene ocean image) for the public awareness campaign “The Next Wave.”



Figure 2 **Figure 7.** Poster in the other visual language (cartoon pictograms) for the public awareness campaign “The Next Wave.”

Response to the Proposed Campaign

The prototype campaign has been presented to scenario coordinators, partnering agencies, and emergency managers, with mostly positive response—but also a large minority of negative reactions. The positive responses have expressed excitement about the creativity of the ideas and enthusiasm that this stands a good chance of reaching some who are difficult to reach with traditional messaging. The negative reactions dislike the logo and the name and reveal concern and frustration within the tsunami mitigation community about how to reduce widespread and persistent misunderstanding that affects tsunami safety.

The campaign logo shows “hooked” waves, and the perceived problems with this are that representing tsunamis with cresting waves perpetuates misconceptions about what tsunamis are like and will encourage surfers to try to surf tsunamis. It is reasonable to propose that a new and separate effort needs to be made to convince surfers that tsunamis provide a poor and potentially deadly surfing experience. However, given the widespread—international—use of similar hooked waves in tsunami signage and information materials, it is reasonable to use a logo that makes visual reference to those materials. Nonetheless, it also makes sense to experiment with logos that still make visual connection to existing tsunami images, but help to evolve the images to communicate additional and more correct tsunami properties.

The campaign name raised objections because it uses the word “wave,” and some in the tsunami community wish to eradicate the word “wave” from tsunami discussion and use only the words “surge” or “tsunami.” This approach would be difficult for tsunami scientists to accept because a tsunami is, in fact, a type of wave. Far more importantly, those who are not tsunami scientists already think of tsunamis as waves, and changing the terminology could result in messaging that is less likely to reach its target audiences.

The Art Center students initially conducted an informal research survey in which they asked participants “what is a tsunami?” Every answer included reference to a tsunami as a wave. Art Center's conclusion was that it would be confusing and would reduce transmission of important messages to avoid use of “wave” when discussing tsunamis. The campaign instead focuses on raising awareness that the tsunami is a different kind of wave than people expect or know. A number of tsunami messaging professionals have indicated to us that they prefer this tactic.

As this report is being published, scenario coordinators continue to work closely with the tsunami mitigation community and Art Center to adapt the prototype campaign so that it will be of use to the preparedness and mitigation community while also effectively communicating with the target audience. Meanwhile, the conflicting reactions to the Art Center campaign indicate a need for consensus among tsunami messaging professionals. Thus, SAFRR has offered completion funding and impetus to reestablish and conclude an effort originally begun by NOAA to develop consensus tsunami messaging. That effort will resume in late 2013.

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