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Sparse data make it 'tricky'

Deep-water sensors did not help scientists make good forecasts

By Jim Borg

POSTED: 01:30 a.m. HST, Oct 29, 2012

LAST UPDATED: 08:25 a.m. HST, Oct 29, 2012

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This was a horse of a different color.

The 7.7-magnitude earthquake that struck off British Columbia on Saturday — and which prompted a tsunami warning and statewide coastal evacuation — occurred in a spot where quakes like that are rare.

It was not, notably, a product of the Cascadia subduction zone, an active tectonic region that stretches from Vancouver Island to Northern California. Scientists have warned that Cascadia has the potential to generate a megaquake like last year's 9.0 off Japan, as it last did in 1700.

But few large quakes have been recorded just to the north, along the Queen Charlotte Fault, near the islands now known



“If all decisions were made based on how it personally affects you, I doubt the Pali, Likelike, and H-3 freeway would have been built or Kalanianaʻole Highway widened. Honolulu's rail project is a matter of equity for West O'ahu.”

— Governor George Ariyoshi

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Craig T. Kojima / ckojima@staradvertiser.com Officials are concocting ways to protect the large batteries that power emergency sirens at Haleiwa Beach Park after three thefts in the past three months.

as Haida Gwaii. It was the largest quake in the area since an 8.1-magnitude quake in August 1949.

And none had triggered a tsunami warning — until Saturday.

"This was a tricky one," said Gerard Fryer, a geophysicist at the Pacific Tsunami Warning Center in Ewa Beach. "We knew this wasn't going to be a giant tsunami. The question was, Is it going to be big enough to cause flooding and require evacuation? It was right at the threshold."

The Queen Charlotte Fault is similar to the San Andreas Fault in California, where the plate boundaries slide horizontally. Earthquakes occur when pent-up pressure is released, but the mechanism usually doesn't produce tsunamis as do subduction zones, where part of the earth's crust creeps under another.

Initially the magnitude was estimated at 7.1. It also had an epicenter on land, which could mean that not a lot of water was displaced.

That's why there was no immediate alert regarding the quake, which hit at 5:04 p.m. Hawaii time.

After further analysis, the magnitude was raised to 7.7, and the estimated rupture zone was extended offshore.

Dennis Sinnott of the Canadian Institute of Ocean Science said a 27-inch wave was recorded off Langara Island on the northeastern tip of Haida Gwaii.

"It was not until we actually saw the tsunami on our deep-ocean gauges that we realized that it was bigger than we thought," said Fryer. "Unfortunately, the deep-ocean gauges gave us a bad angle on the tsunami."

Coastal tide gauges and deep-water sensors off Alaska and the West Coast didn't paint a good picture of the energy directed toward Hawaii.

When the scientists put what little data they had into computer models, some models predicted a wave run-up of 7 feet. After a discussion with state Civil Defense, a tsunami warning was issued at 7:09 p.m., more than two hours after the quake.

"Essentially there was no choice," said Fryer. "We had to go to a warning because we were uncertain. In retrospect the appropriate warning level for Hawaii would have been an advisory rather than a full-on warning."

An advisory means there is no threat inland, but people should stay off the beach and out of the water.

"We're trying to figure out if there is any way we could have known that with the information that we had," said Fryer. "We're still arguing about that."

If the quake had occurred in the Aleutian Islands — the source of the tsunami that hit Hawaii in 1946, or farther south near Washington or Oregon, there would have been "abundant measurements," said Fryer.

The lack of seafloor gauges meant the scientists had to take their best guess.

"We were prepared enough that we had models ready for the situation," said Fryer, "but in distributing the seafloor gauges, since there's only funding for a certain number of them, this was an area that was deemed of lower importance."

The deep-ocean gauges, called DART buoys, measure the tsunami as it passes by. There are eight off Alaska, four off the West Coast and one off Vancouver Island, but none between Alaska and Vancouver Island.

Charles "Chip" McCreery, director of the tsunami center, said Sunday, "We have to take another look at the orientation of our deep-ocean gauges to see if there are any changes we can make so we can cover an event like this. We've spent a lot of time figuring out how to deploy these around the Pacific so we get coverage. Unfortunately, for this event it went between the gauges."

The magnitude of the quake — not too big, not too small — also left room for doubt, Fryer said. "It was right there in the problem field."

Fryer said there are new analytical tools in the works that will help with earthquakes like Saturday's.

"What we don't know is the area that ruptured," said Fryer. "We don't exactly know how large an area of seafloor was deformed, and some of the new tools will help us with that."

When the waves arrived, beginning at about 10:30 p.m., they were about 12 to 15 minutes apart, an indication that much of the energy had bled off to the side.

Dangerous tsunamis typically have a period of 20 minutes, Fryer said.

"When it comes down to it in the end, I'm afraid there are going to be some unnecessary evacuations because we always want to err on the side of safety," he said. "But we are very aware that this was a major inconvenience to everybody and it involves significant costs to the state, so if we can avoid this in the future, we really want to."

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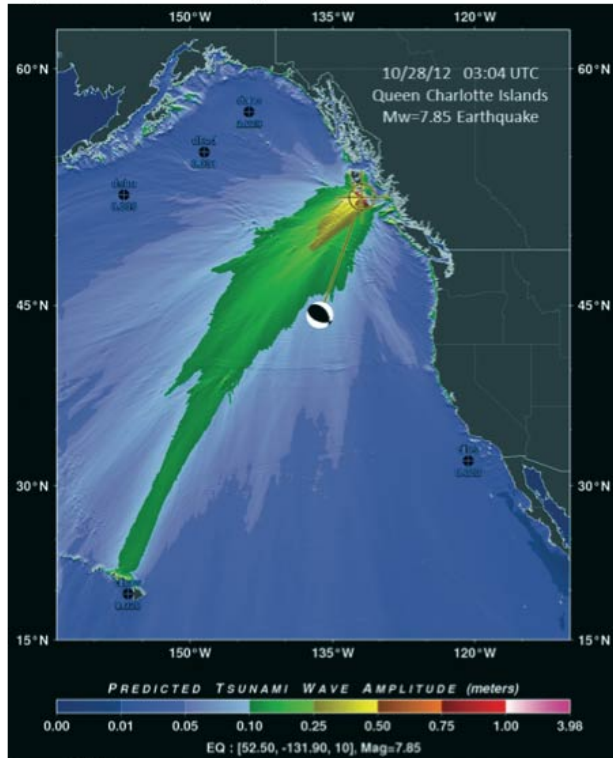
He said the discussion will go on for some time.

"We'll let everyone sort of get some rest and probably (this) week talk about it," he said. "Typically we have a staff meeting on Wednesday, and we'll assemble our thoughts and compare notes with our partner warning center in Alaska."

Meanwhile Sunday, a 6.3-magnitude quake hit the Haida Gwaii region, following more than 40 aftershocks ranging up to 5.5.

A NOTION OF OCEAN MOTION

This graphic, generated at the Pacific Tsunami Warning Center, forecast the wave energy directed at Hawaii from the earthquake Saturday in coastal British Columbia, with the epicenter marked by cross hairs. The green swath represents waves with a height of up to 0.25 meters, or about 10 inches, hitting the isles. That's enough to flood some coastlines. In fact, a wave of about 5 feet was recorded in Kahului but the effects here were minimal. The cat's-eye symbol, which geophysicists call a "beach ball," represents the type of seismic mechanism thought to be at work. The black dots show some of the deep-ocean gauges designed to assess tsunamis as they pass.



Source: NOAA

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Star-Advertiser reporter Sarah Zoellick contributed to this report.

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Wazdat wrote:

oh well, that's a tough one. If there is a lot of damage, then they would be at fault. It seems we have had a lot of these false warnings, but then again nothing has happened, yet.

on October 29,2012 | 04:01AM

 **REPLY**

TmD09 wrote:

This wasn't a false warning. There was a tsunami, but it just wasn't that big. A big one will happen.

on October 29,2012 | 08:30AM

 **REPLY**

al_kikaeda wrote:

Exactly. BTW if you don't like all the crazy traffic just get your emergency NOW. Buy a little every month. Costco has food buckets with a month's worth of food for \$70 and they last 25 years. Buy a couple of collapsible 5 gallon water jugs from Coleman etc. Tsunamis are just a matter of evacuating. Hurricanes, and the weeks afterwards, are what Hawaii should **FEAR**.

on October 29,2012 | 12:10PM

 **REPLY**

MichaelG wrote:

The early communication on TV was somewhat confusing. The reporter asked two simple questions. (1) When were the sirens going to be sounded? (2) Should those living along the coastline evacuate? The answer was very muddled at first. This type of confusion could have led to many deaths if the tsunami arrived. This went on for several minutes. A warning should mean evacuate! Clear and concise communication is needed at the time of a disaster.

on October 29,2012 | 05:29AM

 **REPLY**

false wrote:

People should use their common sense. Earthquakes in the Ring of Fire are a threat. Pay attention to the magnitude and start making preparations. The early warning isn't a Siren. It's the first report of the earthquake. Do you really need Civil Defense to tell you "the ocean is coming"? Magnitude 7.7 is considerable. Let this experience be the boundary for your response. Listen to the DART reports. The .2 ft to .8 ft. doesn't seem to measure a significant deep ocean response for a wave of more than 3 ft. Collect the data people and make your plans accordingly.

on October 29,2012 | 05:55AM

 **REPLY**

allie wrote:

true

on October 29,2012 | 06:25AM

 **REPLY**

Publicbraddah wrote:

Agree totally. People need to start thinking on their own instead of waiting for government to tell them what to do. Instead of having an emergency stock, people panic and cause a lot of the traffic mess.

on October 29,2012 | 09:05AM

 **REPLY**

bender wrote:

Obviously more surface buoys are needed. Is that program continuing or do they consider the job complete?

on October 29,2012 | 07:00AM

 **REPLY**

RingRing wrote:

Let Romney get in and there will be fewer buoys. Think about it. . .

on October 29,2012 | 09:06AM

 **REPLY**

Maneki_Neko wrote:

"Haida Gwaii". I keep wanting to rearrange the letters into a real word.

on October 29,2012 | 08:30AM

 **REPLY**

al_kikaeda wrote:

FTW?

on October 29, 2012 | 12:11PM

 REPLY

loquaciousone wrote:

I had a wagi... tail

on October 29, 2012 | 12:24PM

 REPLY

Publicbraddah wrote:

This incident exposed a lot of weaknesses in our emergency preparedness. Despite a threat that did not materialize, it's always best to err on the side of caution.

on October 29, 2012 | 09:03AM

 REPLY

serious wrote:

Bush did it. We have a very inadequate system here since our Governor gave our hurricane funds to the state union workers--correct?

on October 29, 2012 | 05:13PM

 REPLY

Publicbraddah wrote:

You'd think that with a monthly test of our sirens, at least 95% of those sirens would work in a real emergency. That was not the case this past Saturday. Why???

on October 29, 2012 | 09:09AM

 REPLY

Shh wrote:

Even a false warning is a good warning. Everyone should get into the practice of knowing what to do to be prepared for a real one. It should never be taken lightly and should always be taken seriously. Every family member should be assigned responsibilities to get the family ready. Assign family members in your household duties they can do to help the family be prepared. Everyone should already know what to do or where to meet in case we have another warning. If you haven't already prepared your family, then please do so just so everyone is on the same page and no one has to worry.

on October 29, 2012 | 09:21AM

 REPLY

fwurstiv wrote:

Ring Ring, fewer buoys, maybe, higher taxes no, leave that to obama. There is no perfect situation for a warning system. Get over it.

on October 29, 2012 | 10:28AM

 REPLY

Beaglebagels wrote:

The ignorance of people who drive up to the Pali lookout, elevation 1000 feet, for a tsunami which may be worst case 30 feet high is stunning.

on October 29, 2012 | 10:38AM

 REPLY

shcole wrote:

Those people are no where near as ignorant as those who go to the beach....just saying....

on October 29, 2012 | 12:11PM

 REPLY

al_kiqaeda wrote:

Matched only by the fools that were down at the Kapahulu Groin.

on October 29, 2012 | 12:12PM

 REPLY

RetiredWorking wrote:

cojef wrote:

Bad hot spot. Comments could not be accepted?

 REPLY

Why you would consider that ignorant is confusing. They're in a safe location.....aren't they? FTR, Pali Lookout is 1,200 feet elevation, not 1,000 feet.

on October 29,2012 | 01:20PM

REPLY

loquaciousone wrote:

In Japan some coastal villages have built tsunami walls but the recent devastation was from tsunamis more twice as high as the highest wall. Tsunamis more that a 150 feet have been recorded in certain parts of the world. It has been predicted that if we have a cataclysmic landslide on the Island of Hawaii, it could generate a tsunami over a 1000 feet high. Where is the real stunning ignorance?

on October 29,2012 | 01:54PM

REPLY

loquaciousone wrote:

<http://geology.com/records/biggest-tsunami.shtml> I forgot all about this one and it happened in Alaska in 1958.

on October 29,2012 | 01:56PM

REPLY

on October 29,2012 | 01:16PM

islandsun wrote:

The system should be reevaluated to make sure that all areas have enough sensors in place.

on October 29,2012 | 04:07PM

REPLY

heluhelu wrote:

"We're trying to figure out if there is any way we could have known that with the information that we had," said Fryer. "We're still arguing about that." -- What's not arguable is a) Fryer 'promoting' higher wave surges on TV than the onhand data apparently justified, b) Fryer anticipating 3-6ft surges at various harbors, c) Fryer's obvious 'disappointment' when 10:30 arrived and initial reports confirmed waves which were "slightly less" (actually SUBSTANTIALLY less) than Fryer predicted. Not sure why Borg relies exclusively on Fryer for PTWC feedback when Brian Shiro (PTWC) was more informed, less speculative during his phone updates with Justin Cruz on KHON.

on October 29,2012 | 06:47PM

REPLY

Mach2 wrote:

yeah, right 'tricky'... you pay someone to cry wolf and guess what, they cry wolf almost every time..... the military did not move any of their ships - this 'warning' was a mis-call and should be publicly acknowledged as such

on October 29,2012 | 09:18PM

REPLY

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Deep-water sensors did not help scientists
make good forecasts

By Jim Borg



Craig T. Kojima /
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