

## Tsunami expert's forecast "raises a flag"

By **Sandi Doughton**

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A new analysis based on last year's Indian Ocean **tsunami** suggests a similar earthquake off the Pacific Northwest could generate waves up to three times bigger than the current worst-case scenario.

Washington's evacuation plans assume a maximum wave height of 30 feet, but a computer model at the University of Rhode Island predicts waves of 65 to 98 feet in places along the Washington and Oregon coasts.

While the results are preliminary, they are troubling, said Stéphan Grilli, chair of the university's Department of Ocean Engineering.

"It raises a flag," he said. "I think revising the hazard assessments would be a wise thing to do."

The Indian Ocean disaster and its implications for the West Coast are on the agenda this week at the American Geophysical Union's annual meeting in San Francisco, where Grilli will discuss his work.

Tim Walsh, geologic-hazards manager for the Washington Department of Natural Resources, is skeptical of the Rhode Island simulation, which he doubts accurately reflects the Cascadia subduction zone. This 600-mile-long geologic fault off the Northwest coast has unleashed past tsunamis. But the fault is oriented in such a way that when it slips, a lot of the motion will be sideways, not upward, which means it probably can't kick up waves on a par with the 80-foot monsters that slammed some parts of Sumatra last December, Walsh said.

Still, scientists and emergency managers will review the latest computer-model results and decide whether the region needs to upgrade its threat levels.

"Sumatra is causing some people to think we could have something worse than what we're planning for," Walsh said. "I don't think so, but I'm willing to listen to the people making these arguments."

Vasily Titov, a **tsunami** modeler for the National Oceanic and Atmospheric Administration in Seattle, said his computer simulations point to the possibility of waves up to 65 feet in parts of Washington and Oregon.

At first, Titov said, he thought those numbers were ridiculously high. Then he visited Banda Aceh, on Sumatra's north coast. "If such a huge event could happen there, there is no doubt it could happen here," he said.

Grilli participated in an expedition to the Indian Ocean a few months after the **tsunami**. He and his colleagues used seismic instruments and underwater cameras to gauge how much the

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ground moved in the magnitude-9.2-to -9.3 earthquake that triggered the mammoth waves. In some places, the uplift was nearly 40 feet, he said.

The expedition was partly funded by the Discovery Channel and the British Broadcasting Corp. (BBC).

For a Discovery Channel program, Grilli used his findings in Sumatra and a state-of-the-art computer model to simulate a magnitude-9.2 earthquake on the Cascadia subduction zone. In his scenario, the entire fault ruptures, with displacements of about 60 feet.

All of those parameters seem reasonable, given what's known about the subduction zone, said University of Washington geologist Brian Atwater. Atwater was the first to discover that a massive Cascadia earthquake 300 years ago sent a **tsunami** speeding toward the Northwest coast. It's hard to tell how big those waves were, he said. According to records from Japan, the **tsunami** was up to 15 feet high by the time it crossed the Pacific.

The current worst-case scenario of a 30-foot wave on the Washington coast is based on older computer models and a simplified view of how the fault might rupture in a major earthquake, Walsh said. The Sumatra quake showed that the amount of uplift can vary greatly along the length of the fault. But experts really don't know how to predict which areas might slip the most — which is key to predicting where the waves will go and how big they will be, Walsh said.

For emergency managers, a scenario with 90-foot waves hitting the coast within 30 minutes of a major earthquake is almost impossible to prepare for, Walsh said. Low-lying areas such as most of the Long Beach Peninsula would likely be under water before residents could reach safe ground.

Even with current wave-height forecasts, some county planners have been struggling to come up with high-ground gathering spots for evacuees.

Grays Harbor County has proposed 19 gathering spots, but only seven are 90 feet or more above sea level. Seven are at elevations less than 30 feet.

Anne Sullivan, Grays Harbor emergency-risk manager, said efforts are under way to identify other evacuation areas on higher ground.

Spread along a peninsula that could be inundated by a **tsunami**, the city of Ocean Shores has an evacuation gathering site off the peninsula at a 52-foot elevation. But it is unclear how feasible it would be for people to reach that site before a **tsunami** hit, with the main road clogged with cars.

*Seattle Times reporter Hal Bernton contributed to this report.*

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