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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Stand-Alone Tsunami Alarm Equipment" *by* Akio Katsumata et al.

Anonymous Referee #2

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General comments

For locally-generated tsunamis, the challenge is to issue warnings fast enough for the population at risk to be able to evacuate the danger zone. Does a small, cheap, stand-alone warning system, either supplementing official warnings or substituting for them where no local warning system exists, make sense? Could such a system be rendered robust and foolproof enough to be practical? This paper, while not completely answering these questions, at least raises the issues. The authors propose the obvious sensor: a MEMS accelerometer.

In the event of an earthquake, a stand-alone system must answer the question, "Should I evacuate?" To try to answer that question the authors explore five different variables: shaking duration, peak ground velocity, peak ground displacement, and the products of duration and PGV and duration and PGD. For each variable they establish warning thresholds, but the thresholds they come up with are for a very large earthquake (M

7.8) which, they admit, is already large enough to spawn a "disastrous tsunami." They then apply these thresholds to Japanese and Chilean earthquakes to see how well their warning system would perform.

For most coastlines subject to a damaging tsunami, the authors' system successfully issues a warning, but the rate of missed warnings and false alarms is fairly high. The authors conclude "this method is partially effective in informing people of the possibility of a disastrous tsunami."

Specific Comment

The paper describes a good start, but what comes next? Every event listed is one for which the local population would feel such strong shaking that they should evacuate regardless of what the warning system says. But by far the most serious local warning situation–the reason someone might consider installing a warning system in the first place–is a tsunami earthquake, an earthquake with intensity so low that the local population feels nothing and so does not evacuate, but which is followed by a disproportionately large tsunami. Any stand-alone warning system *must* be designed to identify such slow-rupture earthquakes. While I would not insist that the authors go back and work out how their MEMS sensor system might be coaxed to provide such warnings, they must at least include a paragraph or two about how (or whether) their system and algorithms might be modified to provide warnings for tsunami earthquakes. The discussion would have to include how they expect warning performance to change as they reduce the intensity threshold.

Technical corrections

p. 2, lines 17-18. Replace the sentence beginning "The equipment is considered to have..." with "Our equipment functions as a seismic intensity meter."

p. 2, line 18. Delete the phrase "Here, to limit the area of further judgement,"

p. 2, line 21. Insert "on the Japanese scale" after "seismic intensity of 5.5"

p. 2, line 22. Replace "slight" with "considerable."

p. 2, lines 23. Replace "fault distance" with "distance to the fault."

p. 2, lines 24. Replace "fault distance" with "distance to the fault."

p. 3, line 23. Replace "indicate" with "exhibit."

p. 4, line 5. Change the sentence to read "The red dots denote stations located within 10 km of the shoreline with observation values and seismic intensities above the thresholds (Table 2)."

p. 4, line 11. Change "indicated" to "outlined."

p. 4, line 23. Change "examples" to "example."

p. 4, line 34 - p. 5, line 1. Change "one of such events" to "one such event."

p. 5, line 14. Change "solely" to "alone."

Figure 1 caption. Change "Okada" to "Odaka."

Figure 1 caption. Change "fitted for the part" to "fitted to the part."

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