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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Detectability of seismic waves from the submarine landslide that caused the 1998 Papua New Guinea tsunami" *by* Akio Katsumata et al.

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We are grateful to giving comments on our manuscript. We modified the manuscript (supplement) accoring to your comments.

The main argument of the paper is that there is no detectable seismic signature to the landslide which generated the catastrophic PNG tsunami of 17 July 1998. This statement directly contradicts the work of Okal [2003], in which I presented (on Figure 3) and discussed in detail the record of the landslide at the same station JAY allegedly studied by the authors. It is clear that they used the wrong (very

low-frequency) filters, and thus missed the signal. They do not justify working in such inadequate frequency bands, and completely ignore the detailed analysis of seismic and hydroacoustic phases which went into my 2003 paper.

- Our main concern is tsunami warning. To issue a proper tsunami warning, height of tsunami should be estimated. Size of landslide is an indispensable factor to estimate tsunami height. Detection of a landslide may be possible with short-period seismometers or hydrophones. However those instruments are not useful to estimate size of the total mass. The duration of the waves would reflect the duration of of the landslide. However it is not directly connected to the mass. We missed to describe these matters in the submitted manuscript. We changed the manuscript so that out interest on long period seismic records would be expressed explicitly.

I note on Page 4, Line 9 the statement "The Mediterranean is a seismically inactive region"! This is completely false. The USGS catalog contains 1132 events with at least one magnitude reaching 5 or greater for the period 1963–2015, between latitudes 30 and 45°N, longitudes -5 and 35°E, and depths 0 and 100 km... This factually wrong scientific statement takes an insulting societal tone when confronted to the memory of the thousands of victims of earthquakes in the Mediterranean Basin, documented since historic times.

- We must admit that the expression of "inactive" was improper. We changed expression following Prof. Fryer.

It is wrong to use the reference to Tappin et al. [2008] to suggest that the slide underwent a "deceleration stage affected by interaction of the sliding mass with sea water". All submarine slides will feature such interaction. What was unique in the PNG slide was that it was stopped abruptly when it abutted against the opposite

wall of the amphitheater in which it took place. All of this was explained in detail by Synolakis et al. [2002] and Okal [2003]; as mentioned above, the authors seem to ignore the latter paper, as they ignore the fundamental paper by Sweet and Silver [2003], who conducted the in situ discovery and study of the slide.

- We did not refer to Tappin et al. [2008] to explain the acceleration and deceleration stages. We referred to Tappin et al. [2008] as the estimation of the landslide duration. We added Ekström and Stark (2013) as the acceleration and deceleration stages. We also added Synolakis et al. [2002] and Okal [2003] to mention the short duration estimated from hydprophone data.

The dynamics of the underwater PNG landslide and of the Mt. St. Helens one are totally different, given that the latter was caused by an atmospheric explosion, and reached velocities of 70 m/s (as documented from films) which cannot be sustained by underwater landslides.

- We referred to Kanamori and Given (1982) just to compare the force values. We do not discuss the difference in the sliding process.

The proposal to densely instrument the seafloor in order to detect and identify in real time a landslide and issue a warning is naive in the context of the PNG tsunami, given that the whole process would have to be realized in a few minutes. Most of the casualties at Sissano resulted from the lack of an escape route: the residents were trapped on a narrow spit of land between the Bismarck Sea and Sissano Lagoon. The only survivors had managed to climb the few trees which were not uprooted. As such distances, the only reliable means of tsunami mitigation is proper planning (the village should not have been built on the spit), and in real-time, self-evacuation. References Okal, E.A., T waves from the 1998 Papua New Guinea earthquake and its Fryer identifies missing references and the potential for T-phase warning which could provide an alternative approach.

- Evacuation method is a very important factor for mitigation of tsunami disaster. We consider that awareness of coming tsunami is also an important one at the same time. Only when all factors are controlled properly, the victims would be reduced. So we think we should pay attention to awareness of coming tsunami.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-317/nhess-2018-317-SC2-supplement.pdf

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