Dear Editor,

Thank you for your careful check of our response and revised paper. We correct the expressions accordingly, especially the imprecise explanation of Fig 1, although this point is not crucial for the following numerical simulations. Please refer to our response below. We hope that this version is clarified precisely.

Thank you very much,

Hideo Aochi and all the authors.

There have been a number of improvements but I still remain with a number of worries. Can the title of the paper be changed to read "ground motion" or "ground displacement" rather than "ground deformation"? We have done it elsewhere in the paper and it does change the impression of what we conclude.

Thank you. We changed the title to "ground displacement" to be consistent with the text.

Line 22 (abstract): deformation → displacement

We changed to "ground motion".

Line 68: "if the data are corrected" is not really appropriate (there is nothing wrong with the raw data. How about "if the data can be processed and correctly interpreted in near-real time"?

We changed it as suggested.

I do not get this new sentence added between lines 107 and line 109. ("The high frequencies … ") I have looked at https://doi.org/10.1002/grl.50437 (Yamada et al., 2013) and I do not understand how this paper leads us to conclude that high frequency waves on the seismic signal are related to the interaction between the slide and the water. The word "water" does not appear in Yamada et al. (2013). I think the impact of rock on rock followed by multipathing and coda generation are far more likely to result in an observable seismic signal than the interaction between the rock and the water. The impact of the rock on rock will be first order – the impact of rock on water will be second order when it comes to the seismic signal. I am not saying that Yamada et al. is not a relevant reference here but I do not see how you justify this sentence based on this work.

It is true. The high-frequency ground motion succeeding the landslide block movement is commonly observed, but the source of the high-frequency waveforms is not well resolved. Yamada et al. (2013) suggested the internal collision with the returning mass and other complicated processes on the slipping surface, and Doi and Maeda (2020) as well as Yamada et

al. (2020) suggested the slide and debris flow. We change the text as follows with additional references (Doi and Maeda, 2020; Yamada et al. 2020).

~~**"This high-frequency ground motion reflects the mass movement of the landslide and the generation of a tsunami.**~~

The high-frequency ground motion succeeding the landslide block movement is commonly observed, but the source of the high-frequency waveforms is not well resolved. Yamada et al. (2013) suggested the internal collision with the returning mass and other complicated processes on the slipping surface, and Doi and Maeda (2020) as well as Yamada et al. (2020) suggested the slide and debris flow. Thus, we interpret this high-frequency waves may be generated by the interaction between the water and landslide mass dropping into the water."

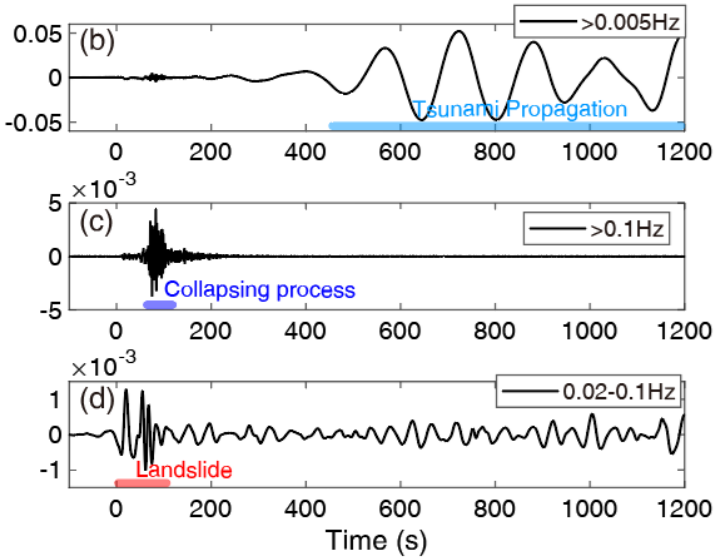
Yamada, M., Y. Matsushi, and T. Matsuzawa (2020). Dynamic movement history of the Iiyama slope failure revealed from seismic data. Engineering Geology. 274(5), 105696, https://doi.org/10.1016/j.enggeo.2020.105696

Doi, I. and T. Maeda (2020), Landslide Characteristics Revealed by High‐Frequency Seismic Waves from the 2017 Landslide in Central Japan 91 (5): 2719–2729. https://doi.org/10.1785/0220200032

Figure 1: Please remove the words "Initial Tsunami" from the figure. If you are able to demonstrate that this HF seismic signal comes from the water waves then please do but to me this looks like ordinary seismic coda – this is what I would expect to see from a landslide falling onto dry land. Coda wave energy lasts a long time without any effect of water. There may be a small contribution to this from the water waves but I do not think it would be measurable or separable from the seismic coda. I may be wrong about this, but I will need convincing! (I see in your responses that you write "As a coda wave generated by the landslide movement, amplitude is too large." Why? I don't think so. To me this is quite normal amplitude for seismic coda.)

We had aimed to point out the timing of the initial tsunami process rather than the cause of the phenomena. The blue bar was too long and may include "coda wave" but we wanted to emphasis that the collapsing process continues in the source area. For avoiding the confusion, we shorten the blue bar and we changed "initial tsunami" to "collapsing process".

In our previous response, we had written "As a coda wave generated by the landslide movement, amplitude is too large." However, we agree that it is not appropriate.



New Figure 1

Line 121: deformation → wave propagation, or solid earth displacement

We change it to "seismic wave propagation".

Line 241-244. Again, we have the claim that the high frequency seismic energy near the start of the seismogram is due to tsunami generation/water waves. I am not saying that this will not have an impact on the seismic waves but I think it will be small compared with the landslide mass itself. The sentence beginning "By considering … " I do not understand. Why does the seismic travel-time of 5-10 seconds mean that the impact fades quickly within 2 minutes?

We wanted to say that the seismic wave passage is quick (5-10 seconds) from source to receiver, comparing to the time scale of Figure 6 (1200 s). We try to identify the timing of the wave packets comparing to our simulations. We remove the expression on the attenuation and change the text as follows.

~~**By considering the fact that the travel time of the seismic body waves is about 5-10 seconds over a distance of 30 km, the impact of this landslide and tsunami generation process on the ground motions fades quickly within two minutes.**~~

"The travel time of the seismic body waves is about 5-10 seconds at the distance of 30 km, so the seismic response appears quickly. The first movement appears about 30-40 seconds, reflecting the timing of the tsunami generation due to the landslide."

Figure 6: Can you taper the data at the start of the window, or extend it prior to doing the filtering? It just looks wrong not starting from zero. Why does the FDM start at zero but not the

Boussinesq? I do not see from panel (a) why there should be any significant difference when applying the same filter. Applying a taper to the start of the window and then filtering would be better than displaying the waveforms like this.

We had applied the taper on both synthetic data. The Boussinesq solution gives a non-zero displacement at the onset of wave height change, while the FDM gives a zero at distance and the ground displacement starts to move gradually according to the seismic waves. Due to this discontinuity, the filtered waveform showed the pre-echo before the onset, even though we added the taper. This is written in the figure caption (Figure 6).

Line 303: "sea area"? Does this mean "water" or "open sea" (in which case how is this defined?)

We changed to water.

Please do a global search for the word "deformation" and think carefully as to whether this is the word you want to use or not, given that this is usually interpreted as permanent change. I see it many times.

Thank you. We checked again. When we talk about the entire process of the simulation, we think "ground motion" is more suitable. If we talk about the consequence on the ground surface, it would be "ground displacement" to be more precise.

I do not understand the new sentence lines 361 – 363. "filtering seismic records is sensitive …"? The response does not need to be flat in order to glean useful information. In short period seismology the instrument response was almost never flat!

We wanted to say that the filtering is sensitive at low frequencies. We remove "where the instrument response is not flat".