

Interactive comment on “Seismo-acoustic energy partitioning of a powder snow avalanche” by Emanuele Marchetti et al.

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On behalf of my co-authors, I would like to thank Dr. Lipovsky for the careful and objective review. We addressed all the comments of the reviewer and this allowed, in our opinion, to greatly improve the work. In particular we discussed in more detail the energy partitioning, as well as equation 1, by taking into account the limited frequency response of the geophones. Moreover, we followed the suggestion of the reviewer and reorganized the manuscript in a more standard form, and this led to a better readability of the text and clarity of the content. Below you will find a point-by-point reply to the comments of the reviewer. Sincerely, Emanuele Marchetti

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Reviewer: I would suggest caution when considering the partitioning of radiated energy between infrasonic and seismic waves for several reasons. The results are somewhat limited by the use of a geophone which is relatively insensitive to low frequencies. I furthermore would generally expect the seismic signal to be lower frequency than the infrasound. Reply: Unfortunately, the high frequency response of the geophones is a clear limitation. This was correctly pointed out from both reviewers. Therefore, we pointed out such a limitation in the text, wherever it applies, in order to make clear that the results might be partly affected by the geophone frequency response. Definitely, in the future we will have to deploy a broadband seismometer collocated with the infrasound array.

Reviewer: The simple Equation 1 does not account for the frequency dependence of waves through a porous snow layer and should be taken with a grain of salt. It also does not account for the specific generation of surface waves which the authors later claim to be important. Reply: Equation 1 describes the transition of infrasound wave (longitudinal waves) to the ground as vertical seismic velocity (body waves). It depends solely from the elastic constant of the medium (μ and ρ). This aspect has been clarified in the text.

Reviewer: I would generally recommend clarifying the distinction between observations and interpretations/results/models. Examples include: First paragraph of Section 4 talks about seismo-acoustic records and their interpretation at the same time. Section 3 (line 104 on) talks about the model. Section 5 largely consists of discussion points. It would improve the readability of the paper to follow a more traditional structure; i.e., Data, Methods, Results, Discussion. Reply: The paper was re-organized following the suggestion of the reviewer.

Reviewer: Figure 6 is in units of counts rather than m/s, which makes it difficult for the reader to assess the scale. Reply: We changed the scale of the figure into m/s.

Reviewer: Line 92-93 Two seconds error seems like rather poor timing. Did any of

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the instruments use GPS for timing? Reply: The infrasound array is equipped with a GPS receiver for time synchronization (line 89). The seismic array was not, and used a GPS receiver to synchronize the acquisition computer clock. There might be an error here. Therefore, we aligned seismic and infrasound data with the occurrence of local earthquakes that were recorded by both system. Here comes the error of two seconds, that despite being very large considering GPS timing, is very low for the aim of our research, that aims to compare seismic and infrasound data at the timescale of the event (tens of seconds).

Reviewer: Could the observations be related to recent work suggesting a more nuanced avalanche classification system (i.e., Kohler et al., 2018 10.1002/2017JF004375)? Reply: A reference to the work by Kohler et al., 2018 has been included in the introduction when describing the PSA that basically corresponds to the Intermediate Regime identified by Kohler et al., 2018.

Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2019-61>, 2019.