Natural Hazards and Earth System Sciences Discussions

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
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Comment on nhess-2022-31

Emma Surinach (Referee)

Referee comment on "Characterizing the evolution of mass flow properties and dynamics through analysis of seismic signals: insights from the 18 March 2007 Mt. Ruapehu lake-breakout lahar" by Braden Walsh et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-31-RC1, 2022

The authors of the paper use seismic signal analysis from 3-component sensors placed at 3 different sites along the lahar channel generated by the Mt. Ruapehu lahar of March 18, 2007 in combination with earlier field observations to draw conclusions about the evolution of the mass and the properties of the flow and its dynamics. They use parameters and methodology already used in other contributions, to which they refer.

The paper needs a major revision.

I have carefully read the manuscript up to Line 308 in the Conclusions.

At that point I confirm myself that to draw valid conclusions the authors have to take into account the amplitude of the frequency peaks. Although different values of frequency peaks appear in the signal, their contribution to the signal should be clarified. The amplitude of the frequency peaks is independent of the signal amplitude. This gives information on the frequency content of the signal.

As an example, in Vázquez et al., (2016) that deals with the seismic characterisation of lahars at Volcán de Colima, Mexico, of 10 Hz the contribution to the seismic signals is superior to the others. It is up to the authors to use this representation or that of Roig-Lafon (2022, https://www.tdx.cat/handle/10803/672460#page=1) or another (e.g. size of the dots). The question is to evaluate the contribution of each frequency to draw accurate conclusions.

The inclusion of this approach will give value to this contribution and will differentiate it

from the other works mentioned in it that deal with the same matter.

In addition, authors must include a data processing section/subsection as well as an explanation (e.g., equations, references...) of how the data results are obtained.

To facilitate the interpretation of the results, the authors must include a table with the values and characteristics observed in the figures, as well as indicate in the figures the different parts described in them. Then, in the discussion, refer to them.

In the following selected details that I consider will improve the manuscript, once corrected.

Line 68. Seismic instruments have been used since 1998 or earlier. I do not consider it relatively young (e.g., Sabot et al., 1998)

Line 69. Specify. There are more geophysical instruments. You are only referring to those relating to vibrations.

Line 83. You must include the purpose of this contribution because the previous ones also deal with this topic. Additionally, you can include directly without splitting subsection 1.1.

Line 130. Homogenize or clarify the terms channel, river... according to the figure, also throughout the text

Lines 144-145 As I understand it, the data you analyze also comes from measurements on the ground. Change the sentence.

Data

Line 155. In the instrument setup, is the vertical component of the instrument orthogonal to the slope or in the zenith direction? In our studies we have observed that the results are different. Part of the seismic energy orthogonal to the slope goes to the other components. Indicate, at least, the angle of the slope where the sensors are installed.

Line 162. Are other instruments co-located with the seismometer? How are the averaged speeds of the lahar determined? Also explain the procedure to fixe the arrival times of the lahar.

Results

The results are values after a data processing.

The description of the figures/results must be explained taking into account the amplitude of the frequency peaks and differentiate between those that are significant and those that are not. In the discussion the authors have to take this into account.

Line 193. In some cases, the event passes over the station, this is not the case. The lahar passes closer to the station. In fact, it is the record at the station of the waves generated by the passage of the lahar. In the figure the different parts are differentiated: head, forehead...

3.2 Directionality

Line 236. Are you considering amplitude of the signal or the energy? The energy of a wave depends on its amplitude and frequency.

Line 250. Note that it is shorter in RTMT (2 min) than in TRAN (3 min)

Line 251. Notice that there is a bend in both curves of the same wavelength but shifted in time. Note the similar concave behavior at RTMM 17-35 min. and TRAN 15-30 min.

Line 254. Describe properly minute 7.

Moreover

Complete the reference Lube et al (2012).

For known and general descriptions, cite previous articles. Avoid the most recent ones unless they add something new.

Emma Suriñach