

Seismology of the Oso-Steelhead landslide

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This paper uses seismic signals and field observations of the Oso-steelhead landslide and estimated the volumes of two failures. This paper includes important information for the study of landslide dynamics and I think it is appropriate for publication of Natural Hazards and Earth System Sciences with minor modification.

Here are some minor comments.

I suggest to change the title to more appropriate one to describe the point of the paper. The current title is so general that readers may have difficulty to get the main subject.

Page 7310, lines 18-21

Add references.

Page 7312, lines 9-19

It is hard to follow which peaks you are mentioning here. Please mark in the figure, or write precise time of the peaks. The term of “closest stations” in lines 15-16 is confusing, since you are showing only one record here. I suggest to rephrase the sentence.

Page 7312, line 19

Are you using period shorter than 30s? Contradict with “we restrict our analysis to signals with periods longer than 30 s” at page 7313 line 22. Add a description of the filter you used.

Page 7312, line 23-24

I am not sure where are the onsets of the first and second events exactly, but both onsets seems to be emergent for me (especially in Fig.3).

Page 7313, line 24 “partially overlapping”

How many seconds do you overlap the triangles? Please specify the shifting time.

Page 7314, lines 3-5

As you used isosceles triangles for a source time function, it seems the end of the force component is always zero. I do not understand why you are adding an extra constraint here. If I do not

understand correctly, please rephrase the sentence so that it is clear for readers.

Page 7316, lines 13-15

Not clear in the Figure which two peaks you are talking about.

Page 7317, lines 4-5

I suggest to specify that the amplitude is that of the first event: “The amplitude of the long-period signal from the first event”

Page 7317, lines 16-end

The authors estimate the volume of the second event from the high-frequency seismograms here. However, there are some points which are not logical for me.

First of all, it is not very clear for me whether these events are rock falls or not, and the mechanisms to produce the high-frequency seismic waves are same with these events and rock falls of which the earlier studies show the empirical relationship between seismic energy and volumes. Authors used the results of earlier studies to validate the volume scaling to the seismic energy, but they did not show the correlation in this limited frequency range. I suspect the seismic energies are depending on the type of events, mechanisms, and size of the events. Therefore, the reasons written here does not support the volume scaling very well.

Page 7318, line 4

The locations for the departure zone are rather assumed by authors than identified.

Fig 3

Can you mark onset time on Fig 3? (17:37:22 and 17:41:53)

Fig 5

I do not understand the meaning of red curve (product of the opposing force and the normalized moment) and possibly was not mentioned in the text. Please add an explanation in the text.