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Title of article: Co- and postseismic subaquatic evidence for prehistoric fault activity near Coyhaique, Aysén Region, Chile

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RC3: Anonymous

RC3 review: Indicated in blue

Stepping late into this review process, I think the manuscript is interesting and the authors considered earlier referee comments up to a certain degree in their revision. The combination of ground motion modelling and sedimentological analyses to estimate seismic hatard is interesting and potentially worth to be published in NHESS. However, the paper is not up to standards considering the description of the methodological approaches to estimate earthquake ground motion intensities as neither the data used nor the methods applied are shown. This should be fixed in the next round of revision.

Thank you for your review. We carefully went over all the separate comments and made the necessary changes to improve the manuscript. The methodology applied for this paper is developed by Vanneste et al. (2018). A reference to this paper is added in the text, but describing the full methodology (comprising a whole paper on its own) would overshadow the message from this paper. Nevertheless, we added a few additional lines for clarification of the rationale behind the methodology. Additionally, all necessary information (parameters etc.) is available in the text to exactly reproduce the outcomes of this work.

P1L13: Please add abbreviation LOFZ because this is frequently used in the text below

This has been added in the revised manuscript.

Figure 1: I wonder why the authors do not use structural geological maps, maybe together with their relief maps here since this would be much more instructive for a general understanding of the study area tectonics, in combination with a symbolization of the general senses of movement of the major faults plotted.

We changed Figure 1a to a structural geological map. Figure 1b is changed to a zoom of the Aysén Fjord area, with its catchment zone indicated. Figure 1c is the previous Figure 1b, thus a zoom of the Lago Pollux area. We hope that by adding the structural geological map, the general understanding of tectonics will be easier.

P5L145: Please show the location of the samples in Fig. 1. What is Section IX?

The location of the cores are indicated on Figure 1 through a red dot (further indicated in the legend of Figure 1) and is also written in the caption of the figure. On P4L133-134 is stated “The present study focusses on sections VIII and IX of the core (9.5-12 m depth)” with a reference to the supplementary information where the whole core is depicted in Figure S3. However, we added “Section IX of core MD07-3117” on this line to avoid any confusion.

Section 3.3: The ground motion modelling approach described here cannot easily be followed. It would be very helpful to show (at least in the appendix) some earthquake data (at least for strong

motion events) and maybe epicenter- and possibly intensity maps to illustrate the modelling approach.
See the explanation after the general review. Additionally, all epicenter data are theoretical as explained in the methodology, either comprising any location in a grid the surrounding of the two considered lakes, or one of the assumed faults. For ease of understanding, we did add the intensity distribution maps for the theoretical earthquake we consider most likely to have caused our observed pattern of sedimentary shaking evidence.

Figure 2: In A, I would suggest to either plot the bathymetric information into Figure 1B or plot the (tentative?) trace of the “Castor Fault” here. The fault zone should be well observable in Figure 2C but there is no line drawing or annotation? It would be nice to have a discussion on the subvertical structural features in the text. I would also recommend to plot depth-migrated seismic sections. In the appendix, a dense array of seismic scan lines is plotted so I wonder why the structural configuration cannot be better documented?
We chose to not plot the fault traces on the bathymetric map as we found no evidence in the seismic profile of this fault. This is noted on P18L487-488. Since we only have 2D seismic data, depth-migrated seismic sections can not be plotted.

P13L378: Please show some sedimentological evidence why the deposits associated with MTD in unit 5.5 can be interpreted as turbidites (the cited Figures are missing this information).
Since we have no (long) sediment core in Lago Pollux, we are not able to provide sedimentological evidence. However, as stated on P9L267-268, a thin transparent facies with ponding geometry was identified on top of horizon 5.5. We interpret these as turbidite deposits, and references are now added to other studies around the world where ponded units above landslide-events are also interpreted as turbidite deposits.

Figure 7: The maps in B and C have no scale. What are the hatched areas (missing in legend)?
The scales are now added on Figure 7b and c. In the figure caption, it was already stated that the hatched areas represent MTDs.

Figure 9: Again, the earthquake modelling approach and the data used for it is not explained or shown. Please improve; a reference to the geological map of Chile from Sernageomin is not sufficient here. Please also mention in the Caption that the location of the maps is plotted in Figure 2.
See the explanation after the general review and the comment on section 3.3. We now mentioned a reference to Figure 1a for the maps, and the reference to Sernageomin merely comprises the position of the fault traces.

Figure 10: The results of this probabilistic modelling are quite interesting, however due to the missing presentation of data and methods they cannot be followed by the reader. Please improve.
See the explanation after the general review and the comment on section 3.3.

P17L459: Considering the discussion on landslide-affected areas, I wonder if there is some landslide inventory available in this area which may be exploited?
We have not found any records of a landslide inventory in this area.