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Interactive comment on “Predicting outflow induced by moraine failure in glacial lakes: the Lake Palcacocha case from an uncertainty perspective” by D. S. Rivas et al.

Anonymous Referee #2

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The article deals with the possibility of predicting outflow from a failure in glacial lakes, by examining the case study of Lake Palcacocha, in Peru. The topic is of sure interest to NHESS, but I found several problems in the article, for which I suggest a major revision. The main points are listed as follows.

Worst-case scenario

The first question to the Authors is why do they assume that a breach of the dam might be more likely than overtopping? Personally, I am not convinced at all that dam breach might be the most likely scenario. On the other hand, overtopping caused by a slope

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movement in the lake could be an alternative, whilst dam breaching only a secondary effects (likely, with minor floods than that caused by overtopping). This is an important point for the whole article, and should be carefully clarified to justify the choice of your worst-case scenario.

The 1941 breach

Authors briefly refer to the 1941 breach (saying that “it still exists”, page 5981) but do not provide any description of it, in terms of morphology, morphometry, where it is located, etc. Further, no information is provided about the 1941 breach: why and how did it occur? What data are available about that event? And, were some remedial works performed after that breach, or was the situation left as produced by the breach itself? What consequences had the 1941 breach in terms of risk to population (that is, where did the flood arrive downstream)?

Dam features

Too many assumptions are presented when describing the moraine dam: for instance, it is assumed that “the degree and compaction of the shallowest moraine layers is likely to be lower than that of deeper layers” (page 5981), but no data are given to support this. Dam geometry and physical properties should be considered when hypothesizing a possible scenario for dam breaching or overtopping. They are not dealt with in the manuscript, and this needs to be corrected in some ways.

Conclusions

The worst-case scenario taken into account by the Authors is not justified by actual data (or, at least, these are not presented in the manuscript). Authors should not forget the social implications of such a work, since the risk to downstream towns is an issue to be treated very carefully, and based on real data to support the choice of both the scenario and the model used.

For all the above points, I recommend a major revision of the manuscript, looking for-

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ward to integration and clarification in the revised version to reply to the doubts and questions presented here.

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