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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 #1

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This article deals with very interesting and appealing topic, which calls increasing attention by scientist world wide. Also the selected study site is very appropriate, with history of catastrophic breaches. Unfortunately, the article has serious methodological problems regarding basic assumptions, which caused that the presented results are theoretical calculations with no or wrong link to the modeled reality. Therefore, I think that the results are unrealistic and unreliable. The article can not be published unless the limiting conditions of the used models are deeply revised and put into a reasonable geological and geomorphologic context. I also urge the authors to consider possible effects of publishing unreliable or highly uncertain and alarmist conclusions regarding

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such a sensitive question as the safety of glacial lakes in the Cordillera Blanca, where the local population has very painful historical experiences with this phenomenon.

Some concluding comments are bellow, with more specific ones directly placed in the text:

Authors did not prove that the used breach model (DAMBRK) is suitable for the geotechnical/morphological setting of the studied moraine. On contrary, they characterize it as "over simplistic"(top of the page 5978) under the study conditions! They also do not explain, why the empirical models used may be adequate for the study site, e.g. if the models were defined on samples with similar geological and morphological conditions as the Palcacocha dam. Most importantly, they do not give any information convincing the reader, that the suggested worst case scenario is possible – they do not explain possible process, which may trigger such a massive breach; they do not show comparable cases from literature; they do not explain why overtopping wave with height of 100m in Safuna Alta (Hubbard et al. 2005) caused no breach despite its dam seems much less stable (much higher and much more narrow) compared with the Palcacocha lake dam; the only reason for the defined worst case scenario is lack of information and uncertainty. It is also not acceptable to present a worst case scenario which "likelihood is unclear", giving no further comments on probability of its occurrence.

The presented result completely lack any attempt of validation against objective data (or at least data/models independent from the author's pre-defined settings), though such data may be available considering the breach left by the 1941 event which description can be found in different sources (e.g. Carey 2010). Applying the approach to the historical event may indicate if it gives reasonable results or not and it could also provide some leads to the definition of the worst case scenario. Authors "validate" output of two models with unknown reliability against each other, which is methodologically not acceptable.

The authors have chance to improve the article so it may be published following

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new submission. The idea to use one more simple (in terms of input parameters) method to define limiting peak flow value for other, more complex providing also better (hydrograph) output, is interesting and applicable, but the “zero” hypothesis (e.g. empirical models in this case) have to be defined and validated using “real world data” (e.g. historical events from the lake – compare to GLOF 2009 from Palcacocha lake or relevant cases from literature).

Please also note the supplement to this comment:

<http://www.nat-hazards-earth-syst-sci-discuss.net/2/C2249/2014/nhessd-2-C2249-2014-supplement.pdf>

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