

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2022-62

stephan harrison (Referee)

Referee comment on "Lake volume and potential hazards of moraine-dammed glacial lakes – a case study of Bienong Co, southeastern Tibetan Plateau" by Hongyu Duan et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-62-RC2>, 2022

Water storage and potential hazard of moraine-dammed glacial

lake in maritime glaciation region—A case study of Bienong Co

This is an interesting paper that investigates a glacial lake and conducts analyses aiming to assess its evolution, basin morphology, estimate its water volume, analyses some possible outburst triggers analysis, and conducts simulations of likely inundation under GLOF scenarios. In general, the paper does a good job of developing these themes and forms a comprehensive case study that could be published given some reasonably substantial changes. I list these here and also some more specific issues with the paper.

1 The paper is often written in a rather vague and imprecise way. In addition, there is often an incorrect use of English. I sympathise with the authors in this; it is difficult for non-English speakers to write precisely and accurately in English but this paper would benefit enormously from careful editing and rewriting by a native English speaker.

2 The literature review is generally comprehensive although there are some papers that should have been referenced and I highlight some of these later. The rationale for the study is clear and appropriate.

3 The sampling strategy and methodology is not clearly discussed. Explain why this lake was chosen. Is this lake representative of others in the region? If so, why and how do you know this? If the lake is not representative, then the authors need to explain its significance.

4 The methodologies used are explained and justified well, and you have used an appropriate range of techniques to explore the geomorphology, characteristics and evolution of the lake and its future behaviour.

5 I am interested in why Bienong Co is regarded as a dangerous lake (lines 100 and 239)? The paper demonstrates that the lake has remained stable for some time, and that it cannot expand further. It also argues that the moraine dam does not contain an ice core. So the description of the lake as 'dangerous' requires much more discussion and evidence. This is important because there is always the temptation to describe any moraine - dammed lake as being 'dangerous' even when the evidence for this is lacking. I know of one well-known reviewer of similar papers who regularly rejects all papers who make this assertion without clear evidence!

6 The paper forms a detailed and comprehensive assessment of the site and models some plausible GLOF inundation scenarios. But this is essentially a paper about one lake and therefore could be criticised as being a bit parochial. What does this say about moraine-dammed lakes more generally? Why is this paper significant enough to be published in a mainstream journal like *The Cryosphere*? It therefore needs much more wider context, and some sense of why the techniques you used are an advance on other similar work, or why you have provided new insights. Otherwise you have just provided an interesting case study.

7 The title mentions water storage, but little is made of this in the paper. How does it compare with other lakes in the region?

8 Under the modelling scenarios presented here, some villages downstream will be completely inundated by the largest GLOF. What are the ethical issues that derive from such an analysis. I agree that we should prepare such assessments but the local inhabitants will be rightly concerned. I'm interested in their views of such analyses.

Fig 8. Difficult to differentiate colours in depth assessments.

Specific issues.

Line 9. Omit 'the' after 'hazard to'

- Insert 'the' before 'potential'.
- Explain the typology of 'maritime'. These glaciers aren't maritime (meaning close to the sea).
- Cite: Harrison, S., Kargel, J.S., Huggel, C., Reynolds, J., Shugar, D.H., Betts, R.A., Emmer, A., Glasser, N., Haritashya, U.K., Klimeš, J. and Reinhardt, L., 2018. Climate change and the global pattern of moraine-dammed glacial lake outburst floods. *The Cryosphere*, 12(4), pp.1195-1209.
- 'such as the ice and/or rock avalanches'. There is no need for the definite article (ie 'the) when the noun is plural. This rule applies throughout this paper.
- Sentence starting 'Study shows...'. This sentence requires rewriting. It is ambiguous and vague. This is also an hypothesis and presupposes that we understand the link between climate change, glacier recession and GLOF incidence.

- Re 'maritime glaciers'. Reword this sentence. Maritime is the wrong description of these glaciers. This means close to the sea.

- Sentence starting 'Therefore'. I completely understand what you are trying to say here....but the use of language is incorrect.

- Delete 'Whereas'.

- I don't agree with this. USV are used quite a lot. Lots of other examples. Cite: Wilson, R., Harrison, S., Reynolds, J., Hubbard, A., Glasser, N.F., Wüdrich, O., Anaconda, P.I., Mao, L. and Shannon, S., 2019. The 2015 Chileno Valley glacial lake outburst flood, Patagonia. *Geomorphology*, 332, pp.51-65. Also papers therein.

- Why was this lake chosen? Explain why this was chosen. Is this lake representative of others in the region? If so, why? If not, then explain its significance.

- the data acquisition module, the data acquisition module. This is repeated.

- Why is the lake described as 'dangerous' if it is stable?

- Where is the evidence that strong earthquakes can produce a full-depth incision in a terminal moraine?

- the ~52.98 km downstream. Explain this.