

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2020-379

Anonymous Referee #2

Referee comment on "The 2020 glacial lake outburst flood at Jinwuco, Tibet: causes, impacts, and implications for hazard and risk assessment" by Guoxiong Zheng et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-379-RC2>, 2021

This paper describes in detail the development of a GLOF using a wide range of technical data, remote sensing and appropriate lake and GLOF modelling. It provides a nice regional example of how some GLOFs may develop and introduces some suggested lag effects that account for the difference in potential GLOF trigger and the actual flood. I think the paper is appropriate for The Cryosphere but some changes are suggested. These are listed below

In the introduction you could expand the references to include: Wilson et al (Wilson, R., Harrison, S., Reynolds, J., Hubbard, A., Glasser, N.F., Wünderlich, 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: Haritashya, U.K., Kargel, J.S., Shugar, D.H., Leonard, G.J., Strattman, K., Watson, C.S., Shean, D., Harrison, S., Mandli, K.T. and Regmi, D., 2018. Evolution and Controls of Large Glacial Lakes in the Nepal Himalaya. *Remote Sensing*, 10(5).

Line 115. Figure 2. "Opposite side". Clarify this. Also reword the caption. What does 'front to back' refer to.

Line 167. Met data section. How important are climate and weather differences over 50km in this mountainous region? I would suggest they are significant (especially precipitation) given rainfall shadow effects. If so, the data may not be relevant for the site. The authors need at least to acknowledge these problems.

Line 300. The timing of the GLOF is not not much warmer than the mean climate, especially compared with other periods of 2020 where it is both above and below the 1986-2015 climate mean. The potential link to precipitation is a bit more convincing but if heavy rainfall is the trigger then the use of a data set from 50km distance might not tell us much. The authors need to reflect on these caveats and complications.

While temperature might show some regional synchronicity, it is not very likely that precipitation does.

Line 309. Why do 2 volume equations not yield meaningful results? Make sure you haven't 'cherry-picked' the ones that do!

Line 440. An alternative assessment might conclude that the landslide and the GLOF are unrelated given the lag times. The GLOF might just be a stochastic event? If so, the climate attribution might be premature (which I think is likely). At least the authors should discuss this issue.

Line 450-457. This section is rather vague. Please discuss what you know and point out what you don't with more clarity.

Line 489. Attribution to climate change is very complicated. Climate warming probably caused the lake expansion (but this might be regional), although calving might also have played a role. The specific event could only have caused a GLOF if the lake already existed, but this does not represent a clear example of a climate change attribution. This section is relatively weak and does not consider what attribution really means here. I would also suggest that the issue of paraglaciation is extremely important, yet there is little consideration of this. Papers by Ballantyne and also by Knight could be cited and discussed.

Line 508. Mention Wilson et al who also assessed GLOFs from moraine landslides.

Finally, we are not told what the moraine dam is made of. How sensitive are the model equations to whether the moraine has an ice core or is composed of sediment. Also what type of sediment is likely, and how does this affect the model results? Are ice-cored moraines common in the area? At least you need to discuss these issues.

Overall, I think this is a nice paper with excellent figures and a comprehensive modelling exercise. It needs some changes but I think it could be published in this journal. There is a reservation about whether this paper is only of regional interest, but I think that they produce a well-argued and comprehensive case study.