

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on **essd-2021-468**

Anonymous Referee #1

Referee comment on "Landsat and Sentinel-derived glacial lake dataset in the China-Pakistan Economic Corridor from 1990 to 2020" by Muchu Lesi et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-468-RC1>, 2022

overall comment:

this manuscript is in good shape. But there are two issues that MUST have attention given to them. (i) Terminology..the classes of lakes are not named at all well. I have suggested what to do. (ii) Argument of why we need to detect small lakes.; I a totally unconvinced by the GLOF angle...rather I suggest thinking about the effects of lakes on glaciers and the fact that many of these newly-formed small lakes will become larger with ongoing glacier mass loss. I have offerred a coitation to start these thoughts but really a whole paragraph needs adding. Else the abstract needs a complete overhaul too.

specific comments:

Line 19: suggest rewording to ...'one of a number of flagship projects...'

Line 22, suggest delete 'critical parameters' and state '...parameters X and Y and Z...' (list them out)

Are these ALL glacial lakes? Or just ice-marginal ones? Supraglacial? Subglacial? Please specify. Add this specification into your methods.

Line 24. I suggest to put the resolution(s) after the dataset type. Split sentence into two. One for lakes, one for glaciers, for clarity (because as written it is not clear if OI was for lakes or glaciers or both).

Line 30...is this 5 pixel threshold for both Landsat and Sentinel? Please clarify the thresholds for BOTH datasets.

Line 31...I'm not sure this is 'discrepancy', rather simply a result that can be interpreted to be due to many small lakes.

Line 32. Are (very) small lakes important? For hazards/GLOFs? Why? I think you need to discuss/show this...in the main text of the manuscript as well as here in the abstract...else the whole premise of your work is not represented/defended/argued (?!).

Line 36...would be more useful to state the types of lakes please. And state the two classifications systems please. Be explicit (!). what is the improved equation?! Name it!

Line 37. Potentials is not plural. Remove the 's'.

Line 48. You really must have to cite Carrivick and Tweed (2016) <https://www.sciencedirect.com/science/article/pii/S0921818116301023?via%3DiHub> please! here. Furthermore, if you read that paper, the size of lakes producing hazardous GLOFs is reported. Small lakes (like the ones detected by your sentinel analysis v landsat) are not hazardous (!).

Line 97. Please explain 'type' is this glacier terminus environment? Is it lake dam type? Is it lake position (supraglacial or ice-marginal for example?).

Line 173. A glacial lake is one that receives meltwater from a glacier. Of these most are proglacial (beyond the glacier) and can be attached (ice-marginal or ice-contact) or detached from the edge of the glacier. PLEASE correct this terminology. Then say what you do (which means you need to evaluate what sort of lakes you are actually analysing!).

Line 186 'without any distance limit'...oh come on there must have been some limit?! The catchment or study area boundary at least?! Please evaluate what you have done and report it carefully.

Line 207 this info. on mapping units needs to be accurately represented in the abstract.

Line 233. This spatial relationship needs to be explicitly named above in the manuscript

where I have already queried it. I dislike this classification. See Carrivick and Tweed (2013) <https://www.sciencedirect.com/science/article/pii/S027737911300293X> for definition of proglacial lakes (my comment for line 173). Supraglacial is a distinct group so that is OK. Proglacial and unconnected are the same/overlap...you need 'ice-marginal' and 'other proglacial' I think, then 'other lakes' as your classes/types.

Line 238. The terminology again is wrong here and confusing because mixes position and dam type. See Carrivick and Tweed (2013) <https://www.sciencedirect.com/science/article/pii/S027737911300293X> . You should have supraglacial, terminus moraine-dammed, lateral moraine dammed, ice-dammed and bedrock-dammed I suggest.

Line 318 to 326. I suggest to compare to (and cite) Carrivick and Quincey (2014) who also consider uncertainty v lake area.
<https://www.sciencedirect.com/science/article/pii/S092181811400054X?via%3Dihub>

Line 453...so do we need Sentinel images for lake mapping?? If Landsat is doing a good job v sentinel (detection as well as accuracy) then why do we need the extra resolution? What importance do the numerous small lakes have? They are not important volumetrically? Are they important for hazards/GLOFs? (I don't think so!). I really think the 'promoted capacity of GLOF risk assessment' (line 543) needs further elaboration.

In contrast, I think a utility of your dataset and indeed your sentinel-based detection of many small lakes is that those small lakes could be the onset of fast-developing proglacial landscapes...and they will likely grow as glaciers diminish further and affect glacier dynamics (see Carrivick et al., 2020 for example <https://www.frontiersin.org/articles/10.3389/feart.2020.577068/full>)