

Interactive comment on “Geometric dependency of Tibetan lakes on glacial runoff” by V. H. Phan et al.

Anonymous Referee #1

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The authors present a new approach to assess the dependency of Tibetan lakes on glacial runoff. They use a glacial mask and the Hydroshed database for this purpose and they define the dependency as the ratio between the glacial area draining into a lake and the total catchment area of a lake. In addition they consider both direct and indirect contributions. Overall the study presents an interesting approach with a straightforward method, that is generally well described and suitable for publication in HESS. I do have some reservations on the hydrological meaning and interpretation of the results and this should be further improved before the paper could be accepted.

How can hydrologists use the R_d and R_u ? A cynical hydrologist may just say this is just a ratio between two drainage areas. What is the hydrological meaning? A glacier melts not over its full surface but only over the ablation area and melt is seasonal. Do

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the rain season and melt season coincide? This needs to be better described in the paper.

There is evidence the glaciers are retreating and this may impact the lake levels. On the one hand the melt rate per unit area is increasing and simultaneously the total glacier area is decreasing. The total melt is the product of both and at some point in the future we will have a maximum melt water peak. Globally this estimated to occur around 2070 (Radic and Hock, 2011) and this is essential because that is what will determine the trend in lakes dominated by glacier melt. It is likely that that point has not been reached in Tibet and hence we would suspect an increase in lake levels that are glacier dominated. From the introduction it seems some lake levels are rising and some are falling and this is contradicting. Later it is shown that for Nam Tso lake levels are indeed increasing, but this needs much better discussion and probably also quantification. Can the observed rise in lake levels be explained by the melt of the glaciers draining into it. A simple DDF based assessment could answer this question.

Lakes in Tibet are very complex and many are connect through complicated ground-water systems, many are endorheic , but this is hardly discussed.

The information content is sometimes a bit low and the paper could be condensed a bit.

Radić, V., and R. Hock (2011), Regionally differentiated contribution of mountain glaciers and ice caps to future sea-level rise, *Nature Geoscience*, 4(2), 91–94, doi:10.1038/ngeo1052.

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