

## **Comment on hess-2021-349**

Anonymous Referee #1

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Referee comment on "Recent hydrological response of glaciers in the Canadian Rockies to changing climate and glacier configuration" by Dhiraj Pradhananga and John W. Pomeroy, Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-349-RC1>, 2021

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Pradhananga and Pomeroy discuss a clearly important topic in a well-written but oddly unbalanced paper: less than 3 pages of the text discuss the results in 11 figures and 11 tables. Figures 2 and 8 and Tables 2 and 4 largely just repeat information given fully in the text. The Sentinel images in Figure 7 are interesting, but never discussed, and all of the relevant information has already been shown in Figure 6. It is useful to have the statistics in Tables 5 to 11 available, but they might be better presented in a supplement (considering, for example, that S2 and S5 mass balance changes are dismissed in a single sentence of the text). Having stripped out the redundancy, it is unfortunate that the J. Hydrol. submission by the same authors is not yet available to check whether this is a rather thin slicing of material for two papers; the authors will have to convince us otherwise in response.

page 2, line 4

"and contribute to flow" would help the reader keep track of where this sentence is going.

page 2, line 22

A strict reading of this sentence would be incorrect: Moore et al. (2009), discussing glacier change in western North America, did not make any postulates about future stream flow in the Himalayas.

page 4, line 15

“proglacial lakes”

page 5, line 15

The locations of the in situ meteorological measurements could be quite well indicated on Figure 1, avoiding this out of sequence reference to Figure 7.

## Section 2.4

More information is required on the bias correction. Is this simply a removal of the average bias over the period of overlap with observations (the text would imply so) or a monthly quantile mapping as used between ERA-40 and ERA-Interim? Were all of the required variables for running CRHM-glacier included in the observations? The periods of the reanalyses (ERA-40 1957-2002 and ERA-Interim 1979-2019) would be useful information for understanding some of the choices made here. For AGRB, I think that ERA-Interim was bias-corrected to 2014-2018 observations, the bias corrections were transferred to 1979-2002 ERA-Interim, ERA-40 was bias corrected to that, and those bias corrections were transferred to 1965-1975 ERA-40 – but I am guessing.

page 7, line 26

The decline in glacier mass is not directly relevant here; it is the decline in glacier area that leads to reduction in peak flows.

page 7, line 31

“but the impact”

page 8, line 2

Delete “resulted”

Figure 1

Elevation would be an attractive addition to the location map.

Is there a particular reason for the different presentation of averages as box plots for temperature in Figure 3 and bar charts for precipitation in Figure 4?

## Figure 5

It is worth noting that the differences in rainfall ratios between past and present glaciers with the same climate are purely due to differences in the areas over which ratios are calculated; no climate feedbacks are included in this study.

Figure 10 shows increased runoff compared with the past for both basins, particularly Peyto. Does this suggest a disagreement or regional difference between modelling and interpretation of observations across the divide in BC by Stahl and Moore (2006)?