Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., author comment AC1
https://doi.org/10.5194/hess-2021-512-AC1, 2022

Reply on RC1

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Author comment on "Quantifying the glacial meltwater contribution to streams in mountainous regions using highly resolved stable water isotope measurements" by Philipp Wanner et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-512-AC1, 2022

General author response to the reviewer's comments for Manuscript hess-2021-512

We thank the three reviewers for their insightful comments regarding our manuscript. We agree with the major comment of the reviewers that our approach of neglecting groundwater as significant interim storage for glacial melt, rainwater, and snowmelt was somewhat simplified and that our dataset does not allow making strong quantitative statements regarding the glacial meltwater contribution to mountainous streams for all hydrological set-ups. Therefore, we plan to slightly shift the scope of the manuscript and we intend to focus more on the opportunities, challenges, and limitations of using stable water isotopes to quantify the contribution of glacial meltwater to mountainous streams. We think that such a scope is still of high and novel scientific value since our stable isotope dataset covering 13 months of continuous sampling in three catchments shows that the quantification of the glacial meltwater contribution works well if two conditions are met: a) The snow must be absent for instance in late summer due to its highly variable stable isotope signature impairing the quantification of the glacial meltwater contribution to mountainous streams and b) the groundwater contribution during this snow-free period must be low in relation to those of the other end-members (ice and rain) or the corresponding groundwater subsurface residence time must be short such that water flow through the groundwater system into the stream does not strongly delay the end-member signal arriving in the streams.

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Pleased find attached the author's responses to the comments of reviewer 1.

Please also note the supplement to this comment:
https://hess.copernicus.org/preprints/hess-2021-512/hess-2021-512-AC1-supplement.pdf