Groundwater Hysteresis Increasingly Decouples Flowing Network Length from Streamflow as Snow Shifts to Rain

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Response to Community Comment CC1

We greatly appreciate the community member's engagement with our study. Our comments are interspersed into the comment in blue.

General comments

- Very good research on a general topic that spans between several fields of geosciences (hydrogeology, siliciclastic sedimentology and hydrology as a minimum). However, some minor issues need to be fixed.

- Snow hydrology in a mountain region is a growing topic due to the climate change.

We thank the community member for their interest, and look forward to addressing the issues raised below.

Specific comments

Line 35. "other fluvial processes". You need to specify all of them (erosion, sedimentation, landslide triggering or whatever you retain relevant).

We have more explicitly specified examples of "other fluvial processes" such as erosion, sedimentation, and contaminant transport.

Line 39. "Longer time scales". Please, specify the order of magnitude for these scales.

We have clarified that this refers to "days to years."

Lines 40-41. "and hydrogeological properties(transmissivity)". You should back-up this statement with references. See research on aquifer transmissivity and groundwater that converges:

Thank you for the interesting references; however, we feel that our statement is of sufficiently common knowledge (i.e., hydrogeologic properties control transmissivity) that it does not merit specific citation in this limited/generic context.

Lines 134. Ok the research questions are clear. Have you been so explicit for the description of the general goal?

We will clarify and condense the overall manuscript goals where possible.

Line 140. You need inserting basic equations when describing routing modelling. The four below are not sufficient in the manuscript.

This was also raised by the reviewers. The routing equations are unchanged from Wigmosta et al. (1994, 2002); we have only refined the geometry controlling the interactions between those equations. Nevertheless, we will add several of the key routing equations for clarity.

Line 360. Double information with same equation on line 49.

Yes, but (re)introduction of the formal power law definition is necessary in this section to proceed rigorously to the definition of the anomaly.

Figures and tables

Figure 1. I prefer the conceptual models below, and the graphs above.

This seems to be a matter of aesthetic preference, and we feel that the timeseries are more important (top) since the network maps are merely exemplative of certain snapshots in time.

Figure 2. The second option would be splitting the figure in two parts.

Keeping both parts of this figure together is essential to understanding the relative magnitude of inflow and recharge.

Figure 4. Months on horizontal axes difficult to read. Please, enlarge them.

Since this figure is already quite dense, and the month labels on the timeseries plots are not essential to the understanding (these time periods are merely exemplative), we feel it is best to keep them relatively small yet still legible (at least in the full-resolution version).

Figure 4. Splitting the figure in two parts to fix the issue?

We feel that keeping the networks close to the respective timeseries aids in interpreting these different types of data.

Figure 7. I suggest the conceptual models below, and the graphs above also for this figure.

As before, this seems to be a matter of aesthetic preference, and we feel that the timeseries are more important (top) since the network maps are merely exemplative of certain snapshots in time.

Figure 9. Do you need an approximate spatial scale?

We have clarified in the caption that this figure is not to scale. Since the streams are enlarged relative to the mountains for visual clarity, it would be confusing to give a single explicit spatial scale.