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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Towards a tracer-based conceptualization of meltwater dynamics and streamflow response in a glacierized catchment" *by* Daniele Penna et al.

Anonymous Referee #1

Received and published: 26 August 2016

Review of "Towards a tracer-based conceptualization of meltwater dynamics and streamflow response in a glacierized catchment" by Penna et al.

This paper describes how the authors have used differences in EC and d2H concentrations between water sources within their high alpine catchment, to derive a conceptual model of the origin of their streamflow (glacier melt, snow melt and/or groundwater). The paper is very clearly written, contains nice and informative figures, and overall I like the message and the methods used/developed in this paper. Therefore I only have several minor comments and questions, that I hope will further improve this manuscript.

I was wondering why you chose to use d2H concentrations for the mixing models and not the d18O. You have measured them both and it would give you another tracer. Is

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there no additional value at all in d18O and what aspect made you chose d2H? I cannot find this reasoning in your paper

Section 182-195: this section reads as results, while it is in the method section. Furthermore it is not explained how you quantify “inconsistent results”. Maybe it is better to show all results in the results section and explain your model selection based on the results in 4.3

Section 4.2: Here you use meltwater fraction, while you only describe the results of the mixing models that calculate the meltwater fraction in section 4.3. To me is seems that section 4.2 should come after section 4.3.

Section 247-259: Meltwater: For both scenarios A and B and C and D, you write about time –variance. However, you only show eq’s for height dependence. Especially for scenario C and D this confuses me. First of all, based on this section, Im not sure if height dependence of d2H is included in scenario’s A and B and if “yes” → how (do you use a detailed DEM with contributing areas for each sampling point, or an average elevation, or the elevation of the sampling point itself?). Second, for scenarios C and D Im not sure how you implemented the “progressive fractionation with time”, because again you write about a “depletion rate of -7 per 100m elevation”, and based on the previous sentence I expected a depletion rate per time. Maybe you can clarify this section,

Minor comments Line 119 acquire → acquired

Line 177: I dont fully understand what you mean with: “The highest contribution of snowmelt to streamflow was assumed from snow melting at approx. elev. Of 2800 masl” Maybe you can rephrase this.

Line 283 “varied” with time of with location?

Line 366. Does meltwater refer to snowmelt or to glacier melt?

Line 369 I don’t understand the addition of " or fairly consistent values over time”. This

does not fit the reasoning of this section.

Line 393: spatial or temporal variability?

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