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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Do streamwater solute concentrations reflect when connectivity occurs in a small pre-alpine headwater catchment?" *by* Leonie Kiewiet et al.

Anonymous Referee #2

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The manuscript entitled "Do streamwater solute concentrations reflect when connectivity occurs in a small pre-alpine headwater catchment?" by Leonie Kiewiet, Ilja van Meerveld, Manfred Stähli and Jan Seibert, presents an important contribution to the understanding of the hydrological connectivity (or non-connectivity) processes that occur in a pre-alpine catchment, monitored at event scale. The authors presented an exploratory analysis of the hydro-chemical composition of potential water sources and streamflow. They applied widely used, though not so novel, methodologies (simple hydrograph separation and EMMA), but complemented the analysis with hydrological connectivity simulations that make this study interesting. The work is well written, clearly structured and personally enjoyed reading it. Despite the short monitoring pe-

riod, I find it with potential for publication in HESS after addressing a few suggestions. âĂć The concept of baseflow depends on the method used to estimate it and does not always describe active groundwater flow pathways. I suggest the authors describe what they defined in this study as baseflow. âĂć The third objective could be modified, it is well known that baseflow and rain mixture (negligible contribution of soil water) does not explain the changes in solutes concentrations in the streamflow. âĂć One of the principles of EMMA is that it relies on conservative tracers (not involved in adsorption or biological processes) and linear mixing process (Hooper, 2001). Did you analyse the conservative behaviour of the tracers? Please include the tests and state what tracers were used. Also, a graph showing the spatial-temporal concentrations of tracers in water sources would help the reader to contextualize their interaction during events. âĂć Regarding EMMA's analysis, I suggest examining the evolution of events in the PCA space (Inamdar et al. (2013); Barthold et al. (2017); Correa et al. (2018)). Their dynamics and hysteresis can show the proximity of the streamflow to a certain source in the different stages of the event. Although as "soft data" it can bring insights into what groundwater or soil water contributes at a certain time. âĂć I am concerned about the very high uncertainties (Table 4), 160% in event III and 143% in event IV. Could it be due to the limited streamflow data, input-data uncertainty or time-dependent end-member variability (Chaves et al., 2008; Christophersen and Hooper, 1992). Unluckily end-member solutions do not exhibit low variability compared to the stream chemistry and not exhibit distinctive concentrations between end-members. I encourage the authors to analyse this limitation in more detail. âĂć As an alternative the authors could refer to: Phillips, D. L. and Gregg, J. W.: Uncertainty in source partitioning using stable isotopes, Oecologia, 127(2), 171–179, doi:10.1007/s004420000578, 2001, to compute individual uncertainties in the calculation of source contributions to streamflow, this methodology considers the number of samples. The author could identify whether the uncertainties remain very high. The introduction, methods and results sections are complete and clear to follow, despite some very long sentences that make a little difficult to follow the ideas. However, I find the manuscript poorly discussed. The authors

support their findings in an extremely local context. The study would benefit from a broader perspective, comparing it with other similar ecosystems and/or with studies of the dynamics of water source contribution streamflow during events for example. I assume the figures will be uploaded in a high-quality prior publication. In S1 please include rain and streamflow samples to visualize their distribution (potential streamflow at different colour scale for low, medium and high flows) and check the paper for a few typos.

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