

Interactive comment on “Water ages in the critical zone of long-term experimental sites in northern latitudes” by Matthias Sprenger et al.

Anonymous Referee #2

Received and published: 18 May 2018

Dear Matthias, other authors,

I already thought there might be some confusion about the used terms. Good to read that this is solved now, and that the analysis was done in the correct way!

My last (and earlier raised) point is the possible issue with the calculation of Water Ages, based on normalization by using the Inflow Mass. Normalizing by Inflow Mass is of course fine when there is one outflow boundary, where all (or most) Inflow Mass is recovered. I am not so sure that this works for multiple outflow boundaries (R, E and T), with unsteady-state flow conditions.

Let's say you want to calculate the mean travel time at one of the outflow boundaries (R, E, and T), of an introduced virtual tracer I_j , then you would normalize the mass flux

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by the recovered mass at that outflow boundary (to get a travel time distribution, and to calculate the mean travel time from this distribution), and you would not normalize by the Inflow tracer mass I_j . Right? I think the approach of normalizing by recovered mass tracer should also be applied to the calculation of Water Ages. In addition, since unsteady-state flow conditions occur, the weighting by Inflow Mass is not consistent for different tracer inflow events I_j , simply because the ratio of recovered mass to inflow mass I_j is not equal for each inflow mass event $I_j, I_j + 1, I_j + 2, \dots$

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-144>, 2018.

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