

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

T. Walter (Referee)

mtw5@cornell.edu

Received and published: 23 April 2018

General Comments: This study uses a previously calibrated 1-D model to ascertain estimates of travel times for different hydrological fluxes and water ages throughout the soil-plant continuum. The results generally agree with conceptual conclusions drawn from empirical studies but provide order of magnitude quantification that is hard to extract from field studies. I commend the authors for showing full distributions of travel times and water ages in their figures even though they mostly concentrate on means or medians in their narrative; I think there is some potentially interesting information in distributions that is not easily distilled into a single number. Overall, I really liked this paper and appreciated the clearly articulated short-comings, e.g., no consideration of lateral flow.

C1

Specific Comments: 1) It was not clear if/how water among the different flow regimes and soil storage interacted in the model? It is possible I simply missed this detail or that it was explained in the authors' proceeding paper. 2) E and T were partitioned by vegetative cover? Was this a simple 2-d percentage over the landscape or in terms of something like leaf area index? 3) The empirical tracer experiments to which the authors compare their results are generally pretty simplistic. I encourage them to consider Kung et al. 2005. Quantifying pore-size spectrum of macropore-type preferential pathways. SSSAJ 69(4) because this empirical study used a much more complex tracer design than most studies and it sort of matches the model design used here.

Editorial Notes: 1) The first line of the abstract seems awkward; the word “respond” seems wrong. 2) I really like the use of colors in the figures but they are not always well explained (e.g., fig. 6); please make this clearer.

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

C2