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Hydrology and Earth System Sciences Discussions

Interactive comment on "On the use of spring baseflow recession for a more accurate parameterization of aquifer transit time distribution functions" *by* J. Farlin and P. Maloszewski

Anonymous Referee #2

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Farlin and Maloszewski (FP) present a study on the use of spring baseflow recession to improve the parameterization of transit time distributions. This is done by estimating the mean residence/transit time from the baseflow recession. The method is demonstrated using data from a fractured sandstone aquifer with a large vadose zone.

The method is based on a number of major simplifying assumptions including a uniform vadose zone and the absence of stagnation points/zones. These are briefly discussed but their potential impact on the results is not interrogated. The manuscript lacks clar-

ity and needs to be restructured and expanded in major parts including explanation of results and theory. The required improvements are beyond major revisions in my opinion, therefore I, unfortunately, have to recommend rejection of the manuscript with the recommendation for resubmission.

10,24: Remove “who” 12,9: remove “are” 12,16: EPM not defined previously, I believe. 12,23: Use “residence time” or “transit time” consistently throughout the manuscript 13,3-4: “and transit time. . .”? Review sentence. It should be pointed out that these are major simplifying assumptions. Impact of these assumptions on the results needs to be investigated. 13,14: The functional relationship of atrazine and tritium transit time distributions needs to be explained in more detail. Otherwise the reader is not able to assess the results. 13,20: It is not clear what is meant by V stored in groundwater system and Vem stored in the reservoir. What is the reservoir? A figure might help. 14,9: Was calibration performed manually with visual inspection of the goodness of fit? There are a large number of inversion tools available. Why not use those? 15,12: There are more reasons for stagnant zones, for example, heterogeneity and stagnation points that result directly from the 3D hydrodynamics and boundary conditions of the system under consideration. 15,18: The discussion on stagnant zones, convex aquifer bases and tracer residence times is confusing. This needs to be clarified. What do the authors mean by matrix porosity is nearly inactive for water and tracer exchange? 16,12: What is the areal extent and climatology of the study area? This section needs to be restructured, because it mixes description of the study area with discussion of measurements, previous study and interpretation. 16,17: What is the thickness of the unsaturated zone (large?) and its variability? A major assumption is that the thickness of unsaturated zone is uniform. 16,25: The description of the sampling needs to be expanded. How many springs? Which parameters were measured where and when? 18,3: Which influences could the authors talk about here? 18,18: Restructure: explanations belong into Methods. 19,7: area ratio? 19,12: How do the authors trace back the decrease in atrazine concentration to the switch to combination products? 19,13: What are hydraulic residence times? 20,1: How can the authors identify this

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main limitation? What about the assumption of a uniform unsaturated zone etc? 20,4: Correlation with rainfall needs to be demonstrated instead of mentioning it in a single sentence in the discussion. 20,13: Preferential flow can of course lead to localized groundwater recharge at the groundwater table.

See also comment by J.Ding.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 14109, 2012.