Interactive comment on "Ecohydrological particle model based on representative domains" by Conrad Jackisch and Erwin Zehe

Anonymous Referee #1

Received and published: 4 January 2018

I do like its originality and the proposed alternative in modelling water movement in unsaturated soils. The authors provide a clear and fair presentation of their model. The paper is well written and well-illustrated.

My comments and suggestions: It is assumed that solutes are moving like water to define the macropores. This is not obvious, since solute can diffuse in existing saturated dead end pores as it is often the case in unsaturated transport. Please comment on this. Is the methodology restricted to 1d vertical macropores? It seems to me that it could be extended to single macropores that have more complicated geometries. The drift term (velocity) is not trivial to me. It is uniform inside a macropore when saturation is reached, it is not before saturation. How is the derivative of the diffusivity handled numerically with macro-pore – matrix interactions? p. 7, line 16: Where is the 0.7 per-

centile coming from ? Solutes are injected at high concentrations (5g/l KBr). Density effects may affect the fluid velocity. I did not understood how the particle breakthrough is computed over the domain. Is it an arithmetic average ? Flux averaged ? This holds for water and contaminant BTCs. The authors are slightly too enthusiastic by interpreting the simulation of the irrigation experiment. First, they provide a comparison for short time (infiltration over 20cm). At this time, it is difficult to identify biases. Second, there is a preferable flow which transported the tracer to a depth of 30-40 cm (see fig. 10) and which is not reproduced by the model. Despite these differences, I agree with the authors that their alternative model is able to simulate that experiment. Concerning the comparison with TDR measurements, how is the support volume defined and how is it taken into account in the modelling?

Typos p. 7, L 28, 'in order' instead of 'in oder'. p. 11, L2-3, 'became' is repeated. Fig. 8, Panel D: Should be' dispersivity' instead of 'Dispersion length'. Dispersion length always increases with time.