Hydrol. Earth Syst. Sci. Discuss., 11, C2663–C2665, 2014
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Hydrology and Earth System Sciences
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11, C2663–C2665, 2014

Interactive Comment

Interactive comment on "An effective parameterization to quantify multiple solute flux breakthrough curves" *by* E. Bloem et al.

J. K. Koestel (Referee)

john.koestel@slu.se

Received and published: 23 July 2014

The authors of hess-2014-178 "present a method to quantitatively characterize datasets gathered with multi-compartment samplers (MCS)". The characterization is achieved by fitting the CDE to individual compartment breakthrough curves (BTC) and by fitting the Beta function to the spatial solute distribution curve (SSDC, see e.g. Stagnitti et al, 1999). Furthermore, a regression relationship is established between the (effective) CDE parameters and the rank of the total amount of leached solute of the respective compartment, using a power-law function. The authors go on to demonstrate that their method can be made fit well to three independently collected MCS datasets. The article is written in good English and is well structured.

I find the here presented datasets are very interesting and valuable but not new. Both Dutch MCS datasets have already been presented and thoroughly discussed in Bloem et al. (2009) and Bloem et al. (2010), the Dutch steel MCS dataset is additionally featured in Bloem et al. (2012). The Australian MCS dataset has been recently presented and discussed in Bloem et al. (2014). It appears to me that neither the proposed method for MCS data characterization is new but identical to the method already used in Bloem et al. (2012), which in turn is very similar to the method proposed by de Rooij and Stagnitti (2002a), except that the power-law function was added for regression. Knowing that i) the CDE fits most soil breakthrough curves from reasonably well (e.g. Koestel, J.K., J. Moeys and N.J. Jarvis. 2011. Evaluation of nonparametric shape measures for solute breakthrough curves. Vadose Zone J. 10: 1261-1275), that ii) the Beta function can be fitted very well to the few SSDCs datasets that have so far been collected (see this manuscript L3P251) and that iii) the power-law function combining the CDE parameters and the SSDC is obviously chosen arbitrarily (see Bloem et al., 2012) and contains 6 fudge factors, it is not surprising that the here featured method to characterize MCS datasets fits the data perfectly. The results presented in figures 4 – 6 are hence rather trivial.

I therefore do not think that the here presented manuscript merits the publication as a HESS paper and propose a release.

Relevant new results are presented in figure 3 and table 1, where the three MCS datasets are compared. I do however think the three MCS datasets offer much more potential for additional characterization, e.g. by calculating the dilution indices and reactor ratios (see de Rooij, G.H., O.A. Cirpka, F. Stagnitti, S.H. Vuurens and J. Boll. 2006. Quantifying minimum monolith size and solute dilution from multi-compartment percolation sampler data. Vadose Zone J. 5: 1086-1092.), or by calculating geostatistcs of the leaching patterns or by looking at scale relationships of the (effective/apparent) CDE parameters (e.g. Koestel, J.K., J. Vanderborght, M. Javaux, A. Kamna, A. Binley and H. Vereecken. 2009. Noninvasive 3-D transport characterization

HESSD

11, C2663–C2665, 2014

in a sandy soil using ERT: 2. Transport process inference. Vadose Zone J. 8: 723-734.) or the SSDC Beta-function parameters as already done in de Rooij and Stagnitti (2000) could provide further solute transport characteristics which could be used to compare the different datasets. Such a manuscript would be very valuable to the soil physics community, especially if additional MCS datasets could be included. I strongly encourage the authors to work in this direction.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 6993, 2014.