Hydrology and Earth System Sciences

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Interactive comment on "Controls of macropore network characteristics on preferential solute transport" *by* M. Larsbo et al.

Anonymous Referee #1

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The manuscript shows interesting relations between the connectivity of the soil macropore network imaged with X-ray CT and preferential solute transport.

The manuscript is relevant for readers of HESS. The methodology used is of high quality and shows the experience of the authors in the field of preferential flow and macropore flow. The results are sound and well described.

The observation that smaller macroporosities with poorer connectivity exhibits the higher preferentiality (nicely illustrated in Fig. 9) is interesting. Regarding Fig. 9 I feel that there is a strong link with the percolation theory, as it also predicts preferential features for intermediate connectivity. I recommend the authors to look in particular at Fig. 7 of Berkowitz and Balberg (1993).

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I have some minor comments: Title: I find it a bit generic the use of network characteristics. What characteristics and what control? Why not connectivity? Or something more specific.

Abstract: I recommend to state more clearly what are the objectives and hypotheses of this work. In particular there is no hypothesis formulation – the same for the introduction.

Page 9559, line 1-2: will the soil structure change after drainage. What was the water content during the X-ray CT? Was the soil dry to allow better visualization of the pores?

Page 9559, line 7: give reference for the use of the 5% arrival time.

Page 9563, line 5: Would the definition of macropores as pores with diameter larger than 484.4 microns affect the analysis? What would you obtain choosing anther diameter? Please, discuss it.

Age 9566, line 1-2: Can this be caused by the small size of the sample compared to the largest pore cluster? In other words is it a problem of REV? If a macropore cluster spans through the entire domain, of course the fraction of macroporosity consisting of the largest pore increases. What would happen with a larger sample?

Page 9567, line 1-2: Please, add some discussion.

Page 9568, line 19-20: probably the main reason is the higher diffusional time into the larger aggregates.

References Berkowitz and Balberg 1993. Water Resources Research Vol. 29 Nr. 4 Pages 775-794.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 9551, 2014.

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