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Hydrology and Earth System Sciences Discussions

Interactive comment on "Applied tracers for the observation of subsurface stormflow at the hillslope scale" *by* J. Wienhöfer et al.

Anonymous Referee #2

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This manuscript presents the interesting results of tracer experiments at a steep hillslope. The authors conducted three experiments to clarify the processes of subsurface storm flow at steep hillslopes. They found the important role of connection of preferential flowpath. Also, they conducted detailed and careful discussion about advantages/disadvantages of tracer tests. I believe that many hillslope experimentalists will have interests in this discussion. There are some aspects that should be discussed with more detail, but I think that this can be done without modifications of the general structure of the manuscript. Therefore, I suggest to the minor revisions listed below are implemented.

Specific comments

1. The role of steep slope One of the main uniqueness of this manuscript is the steep-

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ness of the studied hillslope, as the authors mentioned in Abstract, Introduction and so on. However, they did not discuss the role of slope gradient in subsurface storm flow. It would be necessary to include a comment on roles of steepness of hillslopes.

2. Heterogeneity of flow velocity (Table 3) Based on Table 2, it would be useful to include a brief comment on the heterogeneity of flow velocity in section 4.1. These discussions could be useful to understand processes of preferential flowpath in the hillslope. I am very interested in relatively small (less than one order magnitude) spatial variability of flow velocity, although the flow path i.e., results of dyes staining test, highly varied in space.

3. Flowpath of the spring (Page 2980 Lines 13 and 14) Unfortunately, I cannot fully understand the discussion about spring discharge. As I understand, the authors consider that the preferential flowpaths in soil layer are connected with bedrock aquifer. It would help to know how these were identified.

4. Page 2981 Lines 5 through 18 The authors propose that the multiple peaks of BTCs could be explained by discrete structure of the preferential network. I am interested in this suggestion, but I cannot fully understand the process of it. Do the authors consider that as similar to the previous hillslopes studied by Tsuboyama et al., (1994), Sidle et al. (2000), Uchida et al. (2004) etc., the contributed preferential network changed/extended as change of soil water content/groundwater level due to change of rainfall intensity? Could you provide more details how the flowparhs were discrete?

5. Figure 7 and Page 2985 Lines 15 through 24 Did you consider that there is a linier relationship between travel distance and travel time? Also, did you consider that there are two different linier relationships (for salt and for uranine) between travel distance and travel time? The authors have to clarify this point.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 2961, 2009.