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Discussions
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# *Interactive comment on* "In situ investigation of rapid subsurface flow: Identification of relevant spatial structures beyond heterogeneity" *by* C. Jackisch et al.

**Anonymous Referee #1**

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General: The manuscript should be of interest to a broad group of researchers working on the topic of hillslope runoff generation processes, and in particular of interest to those working on the topic of preferential flow processes as they relate to runoff generation. For the past three decades the challenge with respect to preferential flow has been to be able to verify the concepts developed with regard to modeling preferential flow processes. As in much of hydrology, progress has been made by starting with a black-box approach with predicting outputs for given inputs, and then this has evolved to the use of destructive morphological methods and the use of tracers, and now with more sophisticated instrumentation it being made possible to begin to look at preferential flows in real time non-destructively. The authors report their results of looking at



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Discussion paper

the problem from three scales, the pedon scale, the plot scale, and then the hillslope transect scale. Only a few others have been successful at this, with one notable study by Guo et al. (2013). I believe I am correct to say that the authors state that without the larger scale measurements the local scale measurements would be able to explain the results found only by using some concept of heterogeneity.

Specific: 1. Text needs to be checked carefully for English grammar and sentence structure. I found much of the presentation and discussion to be difficult to follow. Perhaps because of the type of phrases used. The statement that using local measurements one would explain the observations only by using a concept of heterogeneity and would not be able to explain it based on some network of preferential flow pathways. I found all this a bit awkward and would recommend it be rewritten. 2. Not everything is well defined. For instance, the semblance attribute and the structural similarity attribute. 3. Some of the figures are difficult to decipher. They should be able to stand almost by themselves and therefore should be quite self-explanatory. 4. Why not discuss the results presented in comparison to the results presented by Guo et al. (2013). It seems that in their paper they have a very high resolution imaging of preferential flow structures, while in the present paper there seems to be some reservations about the imaging results. It would seem natural that you should compare the Guo et al. paper results to your own results. 5. Check your reference citations and reference list carefully. Upon casual perusal I found some mistakes. There may be others too.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/hess-2016-190/hess-2016-190-RC1-supplement.pdf

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