

Interactive comment on “In situ investigation of rapid subsurface flow: Identification of relevant spatial structures beyond heterogeneity” by C. Jackisch et al.

Anonymous Referee #4

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Review In situ investigation of rapid subsurface flow: Identification of relevant spatial structures beyond heterogeneity The presented study of Jackisch et al. (2016) investigates the identification of structures of preferential flow in the context of heterogeneity based on soil samples, TDR, GPR and tracer measurements. The content is relevant for the journal but the modalities not. The author's introduction to the topic is lopsided and incomplete. The manuscript is more a battle of material and not expedient. There is no red line. Where is the benefit of all these measurements to understand preferential flow patterns? If they would like to present syntheses of all these different measurements reorganisation and more guidance have to be conducted. The authors overextend in the method chapter with details of the measurement devices, which are

C1

unimportant for the story and could be moved to an appendix. The manuscript is not stand alone. An experimental study needs a study site description irrelevant if that is presented in the companion paper or not. Plot 2 has to be linked to the locations of the irrigation experiment and to the sampling. The introduction chapter is not consistent written and needs modification. Where are all the old studies which investigate the presented phenomenon? The overview is incomplete, which makes the sentence on page 2 at line 15 and 28 hardly credible. The block of the models (page 2 line 25-page3 line 3) is not that what I would expect in an experimental study without any simulation is presented. And which is typical for the complete manuscript they are always jumping from one topic to another one without identifiable reasons. There are studies (Heller and Kleber, 2016) which have similar hillslope structures with comparable periglacial cover layers which lead with much less fancy measurement equipment to much more plausible results. Most of the plots are hardly comprehensible. Specific comments: The list is not complete. There are much more points. The authors should firstly rewrite the manuscript.

P2L22: That should be questionable if double peaks are driven by preferential flow. But it is definitely too far of the scope of the manuscript.

P3L8: “highly structured periglacial soils” is in contradiction to what periglacial processes lead to “unstructured” soils.

P3L17: 3d flow fields?

P3L18 large number of measurements is not scientific

P3L18-20: If “the structures remained rather unknown and hardly identifiable even by precise and distributed but static methods like 3D GPR surveying” and that the structure “is rather blurred” why do they examine the phenomenon in 3D?

P4L15-18: Plot and description is missing, manuscript has to be stand alone.

P4L19-30: Move to appendix or leave it out

C2

P5 L5: Locations in a plot have to be shown.

P9L5: Histogram of Ks values

P9L8: That data set which suggests a conductive layer is not presented? Have to be clarified.

Figure 1: Clarify: local means (large connected dots) and individual measurements (small points). Plot 1B) is hard to read and should be rearranged. Transparency is not apparent. Add uncertainty bars. The colour code information is unimportant. The importance of 1C) is not clear.

P9L11: Add geology information

P10L1: Is that the base layer? Hardly identifiable in the plot. It seems to be completely heterogenic.

Figure2: Sketch of hillslope has to added to have a better orientation what is upslope and down slope

Chapter 4.2.4: What is the intention of that measure? Chapter is hard to follow. The usability is not clear by interpreting figure 11. The plot needs more description.

References:

Heller, K., Kleber, A. 2016. Hillslope runoff generation influenced by layered subsurface in a headwater catchment in Ore Mountains, Germany. *Environ Earth Sci* 75:943, DOI 10.1007/s12665-016-5750-y.

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