Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-144-AC2, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Monitoring infiltration and subsurface stormflow in layered slope deposits with 3D ERT and hydrometric measurements – the capillary barrier effect as crucial factor" *by* Rico Hübner et al.

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Received and published: 21 July 2017

First the authors want to thank the anonymous Referee #2 for his/her review of the manuscript and for the constructive and helpful comments. Find our response below each point.

1. As the readership of the HESS journal is multidisciplinary, I think that section 2.3 needs to be revised introducing the concept principles of the ERT technique and, on the other hand, trying to simplify it. Additionally, a clear indication of the accuracy and

limits of the technique has to be given.

A thorough explanation of the ERT method goes beyond the scope of the paper and is not appropriate since there have been lots of ERT papers in HESS (see given citations and references therein). However, to better address scientists from other disciplines that are not familiar with this method, we will add a brief introduction about the principles of ERT. Particularly, since high resolution 3D ERT is not yet commonly used frequently, we also give some detailed information about our methodological framework. We totally agree that there are several limits of our experimental setup. In the revised version, we add a critical discussion about the spatial and temporal resolution of ERT in general as well as regarding technical restrictions of our specific equipment and data.

2. The deepest tensiometers were installed within the coarser soil layer LB2 which, following the grain size distribution illustrated in Fig. 1, consists in a gravel with cobble. It is well known that this kind of devices do not work properly in a very coarse soil as the water continuity through the ceramic cup and the water in the surrounding interparticle pores is not assured. How did the authors take into the account this effect?

We are aware that matric potential measurements in coarse material are very difficult. Therefore, we try to avoid the use of absolute matric potential values and only compared significant points like the start of breakthrough, the time to saturation and the end of breakthrough. We assume that due to the portion of small grain sizes and the huge amount of irrigation water at least a minimal contact to the surrounding pores may register a start of change in moisture content. Even without any contact to the surrounding matrix, the tensiometers should operate as piezometers. In accordance to the resistivity values, we are assure that it is possible to interpret significant points of the matric potential time series. Some critical comments are added to the manuscript.

3. Suction and resistivity measurements, as also indicated by the authors, seem to be not so in agreement for the first top-soil layer. Please, try to better explain the reasons.

The resistivity profile in the uppermost part of the soil deposit assumes very low values: could it be due to a small amount of infiltrating water related to antecedent rainfalls? The suction values and resistivity do not contradict each other. The problems are missing tensiometers in the first top soil layer and generally the punctual characteristics of matric potential measurements. The installation depth of the shallowest tensiometers is at 0.3 m. This does not match the uppermost part with the very low resistivity values. However, this low values may be due to antecedent rainfalls and different material properties (e.g. organic matter and higher humus content). We add some discussion.

4. The statement “this implies that the hydraulic.....” at page 12, lines 20-21, is not clear. Please, try to rephrase it.

Sentence will be rewritten: This may be due to a higher hydraulic conductivity at 1.5 than at 1.2m.

5. Figure 2. Please check the legend and correct. Is the layer at 1.05m the LM2 (as indicated in the legend) or the LB-1? And the grain size distribution of soil at 1.3m is related to LB-1 or LB-2?

Thank you for this comment. In a former version, we classified this layer as LM2. Due to newer sedimentological data, we had to change the classification and the labels accordingly but we clearly missed this one. We will correct this in a revised version.

6. Figures 4 and 5. In order to make easier reading the graphs, and the relative comments in the text, it would be useful to indicate with a bold dashed line the nihil value of matric potential at the various depths.

We agree that due to the different value ranges, it will be easier to read the graphs with an indicator at 0hPa. In a revised version, we added a bold dashed line at 0hPa for the different depths.

7. Please, specify in the text what is the resistivity ratio illustrated in Figures 8 and 9.

In the revised version, we display percentage change relating to the initial model (re-

sistivity change) instead of the ratio which is in better agreement with the percentage changes presented in Figures 6 and 7. Moreover, we add some more explanations in the captions and in the corresponding text.

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