

Interactive comment on “Monitoring hillslope moisture dynamics with surface ERT and hydrometric point measurement: a case study from Ore Mountains, Germany” by R. Hübner et al.

Anonymous Referee #2

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General comments:

This manuscript describes the use of ERT to monitor soil moisture dynamics across a small (~50 m) hillslope. The ERT approach has emerged as an interesting method with potential for 2-D or 3-D soil moisture measurement at a spatial scale relevant to hydrologic processes. The data and analyses in this manuscript appear to be correct. However, it is not clear what new contribution is made in this work. There does not appear to be any methodological innovation presented. There does not appear to be any new insights gained regarding hydrologic processes or properties. The data in Table 1, Figure 2, and Figure 8 have already been presented in prior publications. The

C2250

manuscript contains grammatical mistakes and awkward phrases. The key section on inverting the ERT data (5867/22-5868/12) does not appear to provide enough information for a reader to be able to reproduce the results. If these deficiencies can be corrected, the manuscript should provide some value to the research community as a demonstration of ERT application in this context.

Specific comments:

5860/10. Define ERT on first use.

5860/16. The phrase “and resulting in remarkable coincidence” is grammatically incorrect and not supported by the data. Remove.

5860/18-23. This is a weak summary of the results from this study. Replace.

5861/19. “These up to three layered cover beds” is a poorly constructed phrase. Re-word.

5862/1. Replace “implemented” with “prior”.

5862/2-3. Tracer investigations do not necessarily integrate entire catchments. Remove.

5862/3. There have been many direct measurements on the hillslope scale (in this study about 50 m). Remove.

5862/25. Define EM.

5862/26. Replace “has” with “have”.

5863/2. These studies are not “uncommon”. In fact, they have become quite common.

5863/4. Little was done to address the objective of mapping subsurface structures in this study.

5863/5-6. A few months of data does not represent a “long-term” study. Remove.

C2251

5863/9. What is meant by “different runoff components”? Explain or remove.

5863/13. Remove “the” before “6 ha”.

5863/14. Add a sentence or two describing the vegetation and land use at the site.

5863/16. What is a “slope hollow”?

5864/5. TheraProbes are not truly FDR sensors. Remove.

5864/16. Use lower case theta for soil volumetric water content in accordance with convention in soil science.

5864/19. Is the correct word “insulating” rather than “isolating”?

5865/1. Delete “petrophysical” because the relationship in this case is primarily about soil, not rocks.

5865/10. I do not think “mineralization” is the correct term here. Maybe “electrical conductivity”?

5866/10. What is “hp”?

5867/26-27. Give one or more specific examples of such changes.

5868/6-7. Explain what is meant by these “smoothness constraints” and “regularization strength”.

5868/9. Explain “constraint minimum length”.

5868/10. Explain “adapting the inversion parameter”. What were the final parameters used for each time step? Please provide the key parameters in the text or supporting information. How were the best parameters identified? This sounds like a subjective process. Is it reproducible?

5868/27. Replace the phrase “causes no runoff to the spring at most” with “caused no runoff”.

C2252

5869/1-2. The phrase “decreasing discharge is mainly caused by direct precipitation” does not make sense.

5869/10. “Saturated” not “saturate”.

5869/12. What is meant by “too slow”?

5869/13-14. This sentence does not make sense. Revise.

5870/8. Replace “we accept” with “we assume”.

5871/6. Provide quantitative examples of the differences. They are not obvious in the figure.

5871/7. Define “reciprocal” in this context.

5872/13-17. Poorly written (e.g. “may easier spread” and “toward to the spring”). Revise.

5873/5. Replace “the same depth profile” with “depth profiles of similar shape”.

5873/12. Replace “precise” with “accurate”.

5873/12-13. Delete this sentence because it is not quantitative.

5873/28. Replace “higher amounts” with “higher resistivity values”.

5874/1-2. Replace “moisture conditions” with “higher soil water contents”.

5875/5. What is meant by “A first annual trend. . .”?

5875/8. Delete “a mainstream”.

5876/15. What is meant by “profile A 25 m”?

5878/9. Explain what is meant by “accordingly different depths take part in runoff generation”? As far as I know, runoff occurs at the surface.

5879/3-4. The phrase “The spring discharge consequently shows the major runoff

C2253

generation. . ." does not make sense. Revise.

Table 5. Explain the connection between the data in Fig. 9 and the data used to construct Table 5.

Figure 6. Specify the date for these data.

Figure 7. Specify the date.

Figure 7. Explain how you estimated porosity below 4-m depth when samples were only collected to 4 m.

Figure 8. Specify the date.

Figure 9. Specify the date.

Figure 10. Explain the grey shaded regions in the figures.

Figure 11. I like this figure.

Figure 12. Change the symbols so that the lines can be differentiated even in a grey-scale print out.

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