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Hydrology and Earth System Sciences Discussions

Interactive comment on "Self-potential investigations of a gravel bar in a restored river corridor" *by* N. Linde et al.

N. Linde et al.

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Dear Mrs. Ball, Thank you for your review that contains many useful comments that we will incorporate in the new version of the manuscript that we will submit after the end of the open discussion (13 January, 2010). We are also pleased to learn about your overall positive assessment of our work.

1. The topography variations are less than two meters throughout the gravel bar. I understand your concern in referring to both elevation (hydraulic head) and depth from surface (for SP data). We will improve on this by adding a map of the thickness of the vadose zone under low-flow conditions to make comparisons easier.

2. We will only refer to hydraulic conductivity in the new version of the manuscript.

3. The SP signals were chosen by visually studying the similarities of the CWT's of all input data and the different SP signals. We then chose the SP signals that show the strongest correlations to each of the input signals. This was done to show the full range of behavior in the SP signals. There is no obvious correlation between the behavior of the SP signals and parameters such as elevation or thickness of the water table. This will be mentioned in the new version. We will also try to improve on this by more detailed comparisons with our 3-D ERT model and soil type information.

4. This is a valid comment as water content and rainfall are strongly correlated. The main reason for our suggestion is the Figure 8d and g show SP data that are very strongly correlated to small events in rainfall that show no significant change in the more smoothed out water content data. We will carefully revisit this conclusion and we agree that it might be difficult to clearly differentiate between the two effects using the input data only.

5. We agree that such a study would be very interesting, but we also feel that it might make the paper grow considerably. The paper is already quite long. We also believe (see conclusions) that future more quantitative studies must include arrays of vertically spaced SP electrodes in the vadose zone. We have tried to use representative values of K in the modeling.

6. We will clarify this in the new version.

7. We will rearrange this paragraph as suggested.

8. We will rephrase this sentence to make the meaning clearer.

9. We will add references. Multi-level slug tests, active, and passive tracer tests were used.

10. This information is available and we will add it in the new version.

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11. We don't know why the drift is so much stronger for this electrode.

12. We will discuss in more detail. I think the main reason is rather that this location is rather insensitive to the other processes affecting the data. We will expand on this.

13. We will follow your suggestion.

Thank you again for a constructive review!

Niklas Linde on behalf of the authors

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 8987, 2010.