

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

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This is a well thought out, organized, and written manuscript. It's a nice example of monitoring complex processes that is backed up by a careful wavelet analysis, data inversion, and a coupled electrical-hydrologic modeling exercise to illustrate aspects of the monitoring data.

I think that this paper will be well received within the hydrologic and near-surface geophysics communities. I have only minor comments below.

Lines 40-42. while installing electrodes within rivers may help alleviate the vadose-zone signals, you may introduce other signals associated with changes in river water

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salinity, sediment load, temperature, etc.

Line 53. by using 'time-evolving' here it reads as if this the non-uniqueness problem of potential field methods is only a problem in the time-varying case.

Lines 56-58. could just mention the different processes here.

Lines 56-58. the many different processes, as you show, are the biggest limitation of quantitative SP interpretation. I'd suggest moving this up rather than mentioning it as the third complication.

Lines 60-63. very important. Glad to see it up front.

Lines 81-83. emphasize that the approach is model the complexity into the system rather than treat it as noise that then limits your interpretation.

Lines 109-111. Important.

Lines 218-219. might make the distinction between inverting for current sources and if you know more about the underlying mechanisms, inverting for the flow field, chemical gradients, redox potentials, etc.

Line 282. might mention that the cone of influence is defined on the periodogram. It becomes obvious in the figure but might be unclear what you mean by the regions (in)sensitive to artifacts of the CWT.

Line 301. I don't get what you mean by 'Equation (13) is always 1, ...'

Lines 342-343. I assume this is a mean data misfit.

Lines 350-351. Regarding the depth sensitivity, you can say that the sources cannot be (entirely) below a certain depth due to the abrupt lateral change in the measured SP field.

Lines 409-411. Are these correlations stationary - do they hold through time? For example, does SP11 appear to respond primarily to rainfall during the entire time series?

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Lines 463-465. Important result. Should bring this out more if possible.

There are also a number of references that are missing the publication year.

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

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