Hydrology and Earth System Sciences Discussions

Interactive comment on "A new formulation to compute self-potential signals associated with ground water flow" *by* A. Bolève et al.

Anonymous Referee #1

Received and published: 3 August 2007

General Comments: This paper represents a significant contribution to the emerging field of self-potential (SP) modeling. Given the inherent non-uniqueness in the intrepretation of SP source generating mechanisms, the robust yet realistic modeling approach offered by the authors should allow subsequent researchers to rapidly assess a numer of realistic source models. Confidence is inspired through testing of three field examples, indicating the extent to which their approach can be applied to a wide variety of streaming potential related investigations. While the approach is elaborated within the context of the constuitive equations, it is not entirely clear how such a modeling approach might be undertaken by the uninitiated. Furthermore, while the resultant subsurface SP images are presented, it would be useful to present the actual current distribution. As one might use their model to expand upon other possible SP source

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genrating mechanisms, it would be useful to assess the valiidity of the proposed (i.e, model generated) current flow patterns.

Specific Comments: It would be worthtwhile to include (e.g. as a supplementary figure) a plot of the proposed subsurface current distribution pattern. Similarly, it would be useful to present the current flow densities that yield the modeled SP anomlaies. Cuurent densities may be particualrly diagnostc of certain subsurface phenomena and their presentation might be of value to the interested reader.

In their concluding remarks, the authors speculate on the ability to jointly invert temperature data, something that is presented hastily and does not tie directly to the presented work.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 1429, 2007.

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