



Joint modeling and Bayesian inversion of SP, temperatures and hydraulic data for geothermal systems

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For the use of inverse techniques to characterize hydrothermal systems it is crucial that sufficient and accurate data, as well as good prior information including a conceptual model is available. It is known that fluid flow under certain conditions may produce significant anomalies in Self potential (SP) caused by electrokinetic effects. The use of these easily obtained measurements may be useful to enlarge the data base for the inverse modeling of the corresponding structures and flows.

These effects are be modeled by introducing an additional PDE into a working 3D hydrogeothermal inversion code. While electrical conductivity should be known, it is possible to invert for permeabilities and flow velocities from a combination of SP, temperature and hydraulic potential data obtained from surface and borehole measurements. We will show first results on synthetic models, demonstrating the reduction of uncertainty and increase of resolution. The availability of sensitivities also allows conclusion on the optimal spatial distribution of additional measurements.