Analytic Element Modeling to Investigate the Spatial Sensitivity of ERT. (S01-furman114144-Oral)

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Abstract:

Increasingly, electrical resistivity tomography (ERT) is being used for qualitative investigation of subsurface static phenomena such as strata, buried objects, and distribution of water or contaminants. The desire to extend its use to include quantitative investigation of dynamic processes (e.g. infiltration) demands the optimization of the survey process for time and for measurement accuracy. An analytic element model is developed to describe the electric potential distribution in response to current applied through surface electrodes. We investigate the spatial sensitivity of common and alternative arrays by using this model to compute the response of each array to subsurface conductivity perturbations. Results presented show which arrays are best suited to detect local targets. Regions of the vadoze zone in which each array type is highly sensitive, and therefore may be explored using that ERT array, are identified. Surprisingly, some atypical array types are shown to have more advantageous sensitivity distributions than classic arrays. These results present the first step towards identifying an optimal array set for time-constrained monitoring of transient processes.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 3:00 pm

Keywords:

Non-Invasive monitoring, ERT, Water Content, Analytic Element