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Journal

HS22 Hydrogeophysics, 7

Authors

Linde, N.
Chen, J.
Hubbard, S.
[et al.](#)

Publication Date

2005



Inferring the relation between radar velocity and permeability: a comparison between tracer test and flowmeter data

N. Linde (1), J. Chen (2), S. Hubbard (2), and S. Finsterle (2)

(1) Dept. of Earth Sciences, Uppsala University, Sweden (2) Earth Sciences Division, Lawrence Berkeley National Laboratory, California, USA (niklas.linde@geo.uu.se)

A great deal of interest has developed in estimating site-specific petrophysical relationships between hydrogeological and geophysical properties. We compare two approaches that use either flowmeter (Chen et al., 2001) or tracer test data (Linde et al., 2004) in combination with radar tomograms to infer a petrophysical relationship between radar velocity and permeability, in order to estimate the permeability structure between boreholes. We apply these methods to the Oyster site, VA, and compare the estimated petrophysical relationships. These relationships should be very similar if the assumptions underlying the two methods were fulfilled. We attribute the observed discrepancies between the relationships to space-varying resolution of the radar tomograms, differences in measurement support volume, and the larger sensitivity to 3-D effects in the method that uses tracer test data. We believe that comparisons like this are useful to evaluate the predictive power of hydrogeophysical parameter estimation methods. This work was supported, in part, by the U.S. Dept. of Energy under Contract No. DE-AC03-76SF00098.

References:

Chen, J., S. Hubbard, and Y. Rubin, Estimating the hydraulic conductivity at the South Oyster Site from geophysical tomographic data using Bayesian techniques based on the normal linear regression model, *Water Resour. Res.*, 37, 1603-1613, 2001.

Linde, N., S. Finsterle, and S. Hubbard, Inversion of hydrological tracer test data using tomographic constraints, *Eos. Trans. AGU*, 85(17), Joint Assembly Suppl., Abstract NS13A-04, 2004.