

Estimation of porosity at the Boise Hydrogeophysical Research Site using 2D travel-time inversion of seismic and GPR borehole datasets

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Both seismic and GPR data were collected in a pair of shallow wells at the Boise Hydrogeophysical site, using both borehole-to-borehole and borehole-to-surface shot and receiver geometries. A velocity tomogram will be generated independently for each dataset, from which the porosity distribution will be estimated. A compressional velocity model will be generated from the seismic data and an electromagnetic wave velocity model will be generated from the GPR data using 2D first-arrival travel-time tomography. Structural information inferred from each resulting velocity model will be used to improve the starting model for the other dataset and the inversions will be run again. Empirical relationships relating porosity to compressional wave velocity and to electromagnetic wave velocity will be assessed and applied to the inversion results to produce two separate porosity models. The final porosity model will combine the models from the seismic data and from the GPR data; the relative weighting will be based on our confidence in each inversion.