

GEOPHYSICAL IMAGING AT THE FRACTURED ROCK RESEARCH SITE, FLOYD CO.,
VA

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Recent hydrogeological research by Burbey and colleagues at the Fractured Rock Research Site in Floyd Co., VA, has produced a new geologic and groundwater flow model of the area. Electrical resistivity surveys, borehole geophysics, and tracer and pumping tests have defined a saprolitic shallow aquifer feeding a local spring and an independent deeper aquifer formed by fracturing and brecciation along an ancient thrust fault in crystalline bedrock.

We propose a wide-angle seismic reflection/refraction survey at this site for the purpose of developing a seismic velocity model from travelttime tomography. This model would serve as a starting model for waveform tomography, which can improve the spatial resolution of the velocity model by incorporating amplitude information, including scattered and reflected energy. The seismic velocity model will be interpreted in the context of existing data and petrophysical models to test and refine the hydrogeological model of the site.

We will also investigate joint inversion, an emerging technique in hydrogeophysics, using the seismic, electrical resistivity, borehole, and hydrologic data from the test site to directly invert for a single structural and petrophysical model. The existence of multiple data sets from the site makes it a good candidate for testing a joint inversion algorithm. The result could lead to an improved understanding of the site and of the petrophysics of fractured rock reservoirs.