Monitoring Delayed Drainage with Cross Borehole Ground Penetrating Radar. (S01-ferre110156-Oral)

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Abstract:

A method is shown whereby the response of the vadose zone to pumping is analyzed based on water content profiles measured with borehole ground penetrating radar (BGPR). A total of 32 water content profiles were collected to 10 m depth with a 25 cm vertical measurement interval during a three-day pumping test. Volumetric water contents measured within the saturated zone show a method repeatability of +- 0.01. The maximum volumetric water content change in the vadose zone was 0.22. A numerical, one-dimensional, variably saturated flow model (HYDRUS1D) was used to simulate the response of the vadose zone. The lower boundary condition was defined based on water table elevation measurements made in a piezometer adjacent to the BGPR access tubes. A no-flow upper boundary condition was used. Numerical optimization to the total water in the profile was used to determine the saturated specific yield, the hydraulic conductivity, and the effective van Genuchten parameters of the vadose zone. With these parameters defined, a conventional pumping test analysis based solely on the water table response can be constrained for more exact interpretation of the aquifer storage properties.

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