

Numerical assessment of the direct-push permeameter for investigation of small-scale variations in hydraulic conductivity

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Abstract Characterization of hydraulic conductivity (K) variations on the scale of relevance for transport investigations is one of the main challenges faced in groundwater investigations. Recent work has shown that direct-push technology has great potential for providing high-resolution vertical profiles of subsurface parameters (e.g. K) in shallow unconsolidated formations. The direct-push permeameter (DPP) is a particularly promising tool for hydrostratigraphic characterization, but our understanding of its performance in highly heterogeneous formations is far from complete. This work is directed at advancing our understanding of DPP performance in highly heterogeneous media. We evaluate DPP potential through a series of numerical simulations using a heterogeneous configuration that is based on a previous aquifer analogue study. Our results demonstrate that the DPP can provide reliable K profiles, even in the presence of vertical K variations on the decimetre scale, and that the DPP configuration has a significant influence for the characterization of smaller-scale variations in K .

Key words hydrostratigraphic characterization; model parameterization; direct push