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Prediction of hydraulic parameters at test-site Schillerslage using SIP field and lab measurements

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In this study a combination of SIP profiling, sounding and lab data was used for an advanced aquifer characterization in the new LIAG test site Schillerslage. On the basis of inverted 1D- and 2D SIP data, two approaches, the first suggested by Börner et al. (1996), the second by Slater and Lesmes (2002), were applied to calculate the parameters porosity and hydraulic conductivity (kf). Until now single frequency analysis around 1Hz is done.
The geological structure - two sandy aquifers separated by a fine-grained till layer overlaying cretaceous marls – is imaged well by 1D and 2D SIP field data. Since the lower aquifer is affected by high conductive layers, the focus is on the upper one. There, porosities between 20 and 30% and kf values between 10-4 and 10-2 m/s are calculated by the Börner approach, while the Slater approach yields kf values between 10-5 and 10-4 m/s. First SIP lab results indicate porosities around 25% and kf values around 10-4 m/s.
While the two field measurement techniques yield very similar results, lab results still show deviations. Hence, effects of different fluid conductivities and temperatures have to be quantified accurately. Moreover, the used equations yield different kf values: the Slater and Lesmes equation produces generally too low results, probably due to the tight validity range of this empirical relation. A substantial estimation of these results requires pumping tests, hydraulic tomography and further lab measurements to assess reliable hydraulic properties, which is ongoing work.