



## **On the use of grain size data for high resolution hydraulic conductivity characterization of heterogeneous aquifers**

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Knowledge about hydraulic conductivity ( $K$ ) and its variation in space is a major objective of hydrogeological site investigations. However, measurement of  $K$  at a high spatial resolution in heterogeneous sedimentary aquifers remains challenging. Even though concerns about the suitability have been raised in several publications, the estimation of  $K$  based on grain-size distribution data is still a widely used and well-established technique for high resolution site characterization amongst scientists and practitioners. Hence, a vast number of different empirical and semi-empirical formulas already exist and even more adapted formulas are proposed. This is due to the simplicity of this approach and, historically, due to the lack of reliable alternatives. In this study we present results from field and laboratory evaluations that clearly highlight the intrinsic limitations of using grain size data for the high resolution  $K$  characterization of heterogeneous aquifers and quantify the resulting uncertainty in  $K$  estimates. Furthermore, we show that reliable alternatives for high resolution  $K$  characterization exists today – focusing on direct push-based tools and sensor probes.