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Quantitative comparison of impeller flowmeter and particle-size distribution techniques for the characterization of hydraulic conductivity variability

Marco Barahona-Palomo (1,3), Monica Riva (2), Xavier Sanchez-Vila (1), Enric Vazquez-Sune (3), and Alberto Guadagnini (2)

(1) Department of Geotechnical Engineering and Geosciences, Technical University of Catalonia, Barcelona, Spain (marco.barahona@upc.edu, xavier.sanchez-vila@upc.edu), (2) Dipartimento di Ingegneria Idraulica, Ambientale, Infrastrutture Viarie, Rilevamento (DIIAR), Politecnico di Milano, Milano, Italy (monica.riva@polimi.it, alberto.guadagnini@polimi.it), (3) Department of Geosciences, Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, Spain (enric.vazquez@idaea.csic.es)

Basic univariate statistics and key geostatistical parameters of estimates of hydraulic conductivity obtained at the decimeter scale by two different methods are presented and compared. The two estimates are based on (1) the empirical Kozeny-Carman formulation, and (2) impeller flowmeter tests. The former provides values of conductivity, K_{GS}, based on particle size distributions. Impeller flowmeter techniques allow inferring conductivities, K_{FM}, from measurements of vertical flows within a borehole. Data obtained during an extensive monitoring campaign at an experimental site located near the city of Tübingen, Germany, are considered. Statistics of the natural logarithm of K_{GS} and K_{FM} at the site are similar in terms of mean values (with averages of *ln* K_{GS} being slightly smaller than those of *ln* K_{FM}) and differ in terms of variogram ranges and sample variances. The correlation between the two sets of estimates is virtually absent. Additional data from two different sites already presented in the literature allow comparing conductivity estimates from flowmeter and grain-size distributions (or permeameter measurements) taken at adjacent wells and support the finding that K_{GS} and K_{FM} lack correlation. The analysis highlights the difficulty in obtaining meaningful quantitatively comparable hydraulic conductivity data at the decimetric scale.