Spatial characterization of hydraulic conductivity in alluvial gravel-and-sand aquifers: a comparison of methods

S. DIEM, T. VOGT & E. HOEHN
EAWAG, the Swiss Federal Institute of Aquatic Science and Technology, Department Water Resources and Drinking Water, Ueberlandstrasse 133, 8600 Duebendorf, Switzerland
samuel.diem@eawag.ch

Abstract For groundwater transport modelling on a scale of 10–100 m, detailed information about the spatial distribution of hydraulic conductivity is of great importance. At a test site (10 × 20 m) in the alluvial gravel-and-sand aquifer of the perialpine Thur valley (Switzerland), four different methods were applied on different scales. The comparison of the results showed that multilevel slug tests give the most reliable results at the required scale. For their analysis, a plausible value of the anisotropy ratio ($K_{vertical}/K_{horizontal}$) is needed. For alpine and perialpine aquifers, a range of 0.1–0.2 can be expected. Flowmeter logs are recommended, if the relative distribution of hydraulic conductivity is of primary importance. Sieve analyses should be used, if an accuracy of a factor of 3 is acceptable. Pumping test results indicate the upper boundary of the natural spectrum of hydraulic conductivity at the scale of the test site.

Key words hydraulic conductivity; multilevel slug tests; flowmeter logs; sieve analyses; pumping test