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On soil hydraulic conductivity variability in inverse methods

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The increasing importance of landscape scale hydrology imposes particular attention to the procedures of characterization of soil hydraulic property, namely the water retention and the hydraulic conductivity functions. Spatial variability of soil properties in the region of interest, especially the soil hydraulic conductivity, influences very deeply water movement in soil. Use of mathematical models for the forecast of the hydraulic behavior demands therefore accurate hydraulic parameterization. The burden of hydraulic tests can be partially mitigated resorting to inverse methods, that rely on the parametric description of the hydraulic properties. In this work we evaluated the effect of the choice between various parametric relations for the description of the hydraulic conductivity in order to verify the impact that they exert on the estimation and on the spatial variability of the hydraulic conductivity.

The inverse method adopted in this study is applied to evaporation trials conducted in laboratory on 89 undisturbed soil cores, taken every 1,5 m along a 132 m long transect located near Naples (Ponticelli). At selected time during the evaporation process soil mean water content was monitored as long as soil water potential at two depth.

van Genuchten relation was selected for the water retention function, while various parametric relations were chose for the hydraulic conductivity function. Statistical comparison between conductivity values estimated with a direct method (Wind) shows biases. Moreover geostatistics is used to describe the spatial structure of hydraulic conductivity values and comparisons are carried out between semi-variograms.