Assesing spatial variability of selected soil hydraulic properties using analysis of internal drainage experiments

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Unsaturated hydraulic properties and their spatial variability of a volcanic soil, localized in Ponticelli (Naples) were evaluated in order to use properly mathematical model suitably developed to simulate flow of water and solute movements in the field-scale soils. The instantaneous profile method was applied in open field, during a drainage process. Both volumetric water content and water potential were measured, at different time intervals, along a two line transects at 40 positions distance of 1 m apart and at three different profile depths. A finite difference form Darcy's law was used with zero flux boundary conditions on the soil surface. This research showed that the method, based on rigorous theoretical principles, combines rapidity and simplicity with reliability of results. The spatial variation in hydraulic conductivity was found to be even greater than that of other physical parameters. Using geostatistical techniques to analyze the spatial dependence of observations, the data proved to be correlated over space, with a range of about 7-9 m.