



Influence of soil heterogeneity on the solute concentration extracted with suction cups

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Porous cups provide a simple and direct method for water sampling in the vadose zone and are still widely used. A serious limitation, however, resides in the fact that the suction cups act like a small point sink and, therefore, soil heterogeneity plays an important role in the amount of extracted water and solute concentration. In the present work, numerical simulations were conducted to examine the impact of soil heterogeneity on soil water extraction with suction cups for a better understanding of observed field data. For the simulations of the soil water fluxes the HYDRUS-2D software package was used. Soil heterogeneity was generated using a random field generator based on the Miller-Miller-similar-medium approach. For the simulation stationary and non-stationary flux conditions were chosen. The results indicate that the mean pore water velocity, dispersivity and mass recovery depends on the location of the suction cup in the heterogeneous flow field. The effects are even more pronounced for non-stationary flux conditions. For stationary conditions the suction cup sampling area and suction cup extraction domain are also influenced by the soil heterogeneity.