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Simulating the water movement in a maize cropped field in Northern Italy with the SWAP model

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In the last few years the water scarcity during the irrigation season is a recurrent event in the Po Valley (Northern Italy). For this reason the optimization of water use in this area, where irrigated maize is cropped, cannot be further eluded. The use of predictive models may not only improve water saving, but may also minimize groundwater contamination by fertilizers and pesticides.

Calibration for the specific environmental conditions of the field sites is required before adopting any model for a purely predictive use. During this calibration, special attention must be addressed to the input values of those variables which are most affected by spatio-temporal variability within the field.

In this paper, the SWAP 2.07d model for predicting the water consumption and the volumetric soil water content in a maize cropped field located in an experimental farm in Northern Italy are evaluated. Despite this model has been widely used, uncertainties still arise when applied to conditions different than those for which the model was tested. Vanclooster et al. (2000) recommended the use of high quality datasets to test models, in view of management applications.

The model was calibrated and validated with two different field datasets. Both volumetric soil water content and pressure head data at different depth were collected. The phreatic surface was continuously monitored. For all the horizons the physical and chemical characteristics were determined. $\theta(h)$ e $k(\theta)$ relationships were obtained in the laboratory by means of an evaporation experiment (Tamari et al, 1993).

Simulation graphics and modeling statistics were used to assess the validity of results obtained during simulations. Sensitivity analysis was carried out to identify the crucial

input parameters: both the LAI and the hydraulic conductivity of the top soil seem to have a significant influence on predictions.