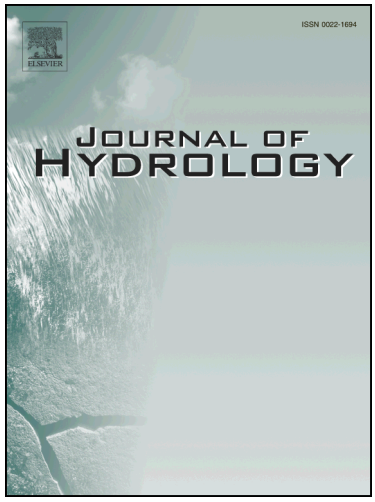

Research papers

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A comparison of numerical and machine-learning modeling of soil water content with limited input data

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Abstract

Soil water content (SWC) is a key factor in optimizing the usage of water resources in agriculture since it provides information to make an accurate estimation of crop water demand. Methods for predicting SWC that have simple data requirements are needed to achieve an optimal irrigation schedule, especially for various water-saving irrigation strategies that are required to resolve both food and water security issues under conditions of water shortages. Thus, a two-year field investigation was carried out to provide a dataset to compare the effectiveness of HYDRUS-2D, a physically-based numerical model, with various machine-learning models, including Multiple Linear Regressions (MLR), Adaptive Neuro-Fuzzy Inference Systems (ANFIS), and Support Vector Machines (SVM), for simulating time series of SWC data under water stress conditions. SWC was monitored using TDRs during the maize growing seasons of 2010 and 2011. Eight combinations of six, simple, independent parameters, including pan evaporation and average air temperature as atmospheric parameters, cumulative growth degree days (*cGDD*) and crop coefficient (K_c) as crop factors, and water deficit (*WD*) and irrigation depth (*In*) as crop stress factors, were