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Estimation of soil moisture in paddy field using Artificial Neural Networks

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Abstract

In paddy field, monitoring soil moisture is required for irrigation scheduling and water resource allocation, management and planning. The current study proposes an Artificial Neural Networks (ANN) model to estimate soil moisture in paddy field with limited meteorological data. Dynamic of ANN model was adopted to estimate soil moisture with the inputs of reference evapotranspiration (ETo) and precipitation. ETo was firstly estimated using the maximum, average and minimum values of air temperature as the inputs of model. The models were performed under different weather conditions between the two paddy cultivation periods. Training process of model was carried out using the observation data in the first period, while validation process was conducted based on the observation data in the second period. Dynamic of ANN model estimated soil moisture with R2 values of 0.80 and 0.73 for training and validation processes, respectively, indicated that tight linear correlations between observed and estimated values of soil moisture were observed. Thus, the ANN model reliably estimates soil moisture with limited meteorological data.

Keywords – soil moisture; paddy field; estimation method; artificial neural networks