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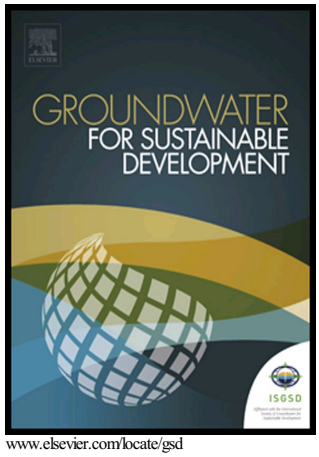

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Modeling response of runoff and evapotranspiration for predicting water table depth in arid region using dynamic recurrent neural network

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Abstract

The investigation of the dynamic response of aquifer to rainfall with variation of the atmospheric conditions is a key issue for groundwater resource management. A data-driven dynamic recurrent neural network approach, based on multi-objective optimization is used here to forecast groundwater levels as a function of rainfall, temperature, humidity, runoff and evapotranspiration data. Recurrent Neural Network (RNN) with variable transfer functions like tangential sigmoidal, purelin and logarithmic sigmoidal are used to compute the relative performance of the model. The results demonstrate the transition behavior due to changing evapotranspiration and runoff. Statistical and graphical indicators are used to compare the results. The statistical indicators used in this work are Mean Square Error (MSE), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Coefficient of Determination (R^2). From the results, evapotranspiration loss and run off are the influencing parameters which affect the depth to water table in the ground water reservoir. It is observed that calculated losses due to evapotranspiration are comparatively less during high precipitation in the Rengali province. Results of R^2 suggest that inclusion of evapotranspiration and runoff in different scenario improves the model efficiency in predicting water table depth.

Key words: ***Water table, Precipitation, Temperature, Evapotranspiration, Runoff, Recurrent neural network***

1. Introduction

Aquifers are modeled according to their conceptualization and calibration of model parameters (Anderson et al. 2015). The procedure is based on the physics of the system by calibrating the