Geophysical Research Abstracts
Vol. 19, EGU2017-13155-1, 2017
EGU General Assembly 2017

Data Driven Models to Forecast Groundwater Level in Response to Hydro-climatological Conditions and Agricultural Water Demand

Alessandro Amaranto (1,2), Gerald Corzo Perez (1), Dimitri Solomatine (1,3), George Meyer (2), and Francisco Munoz-Arriola (2)

(1) Unesco-IHE, Institute for Water Education, Delft, The Netherlands, (2) Biological System Engineering Department, University of Nebraska-Lincoln, Lincoln, Nebraska, USA, (3) Water Resources Section, Delft University of Technology, Delft, The Netherlands

Water table forecasts are important for development of water management plans, especially in areas where groundwater is the main resource for irrigation. This study aims to investigate the capability of different data-driven models to forecast water table levels from one to five months ahead. Five different models (Random Forest, Support Vector Machines, Artificial Neural Networks, Deep Neural Networks and Genetic Programming) are developed to predict the water table level in response to hydro-climatological variables (precipitation, snowmelt and evapotranspiration) in an intensively corn-cultivated area in the Platte River Basin (Nebraska, USA). Corn water demand and precipitation forecasts are also considered as possible inputs to the model. Four error statistics (root mean squared error, coefficient of determination, percent bias and Nash-Sutcliffe index) and two baseline references models (autoregressive and naïve) are used to compare the accuracy of the different models. Results for the case under investigation show that all considered data-driven models predict water table depth with high accuracy up to two months ahead. When the prediction horizon increases, a model using genetic programming is showing better results than the other modelling techniques, in particular when the corn water demand and the forecasted precipitation are included as inputs.