Estimation of Well Hydraulic Heads in a Karstic Aquifer using a Neural Network Model

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3. Artificial neural networks (ANN) are a global approximator capable of finding the relations between parameters that are highly connected, as those of the aquatic equilibrium are. Therefore the use of ANN has found implementation in the recent years to simulate the hydraulic head of an observation well. The method can be used to porous as well as karstic aquifers. In this study a neural network model has been applied to simulate the head of wells located in the pumping site of the water company of Athens. The karstic geologic setting would be difficult to simulate with models designed for porous aquifers. The input parameters are parts or connected to parts of the aquatic equilibrium, and the output parameters are the hydraulic heads of the wells. At first a calibration procedure has given values to the weights of the ANN. The calibration used actual field data collected from the site from January 2005 to June 2006. After that an evaluation of the calibration was performed, with the use of field data that were omitted from the calibration procedure. This is necessary in order to avoid the danger of overtraining the network, which causes diminished prediction ability of the model. The results show that the model can even extrapolate in regions not in the calibration data set. The produced error was small enough to add to the credibility of ANN as a simulation of groundwater method.