RAINFALL-RUNOFF MODELING OF MOUNTAINOUS CATCHMENT USING AN ARTIFICIAL NEURAL NETWORK

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An artificial neural network (ANN) is a reliable mathematical mechanism in modeling the complex nonlinear relationships between input and output time series. ANN models have been proven effective and efficient to model the rainfall-runoff relationship in situations where explicit features of the internal hydrological subprocesses are difficult to be described using physically based equations. A new algorithm using a combination of linear least squares and multistart simplex optimization is developed to show the mechanism and parameters of three-layer feed forward ANN models and the potential of such models for simulating and forecasting the non linear hydrological behavior of mountainous catchments. The output "rain plus melt" from the snow accumulation and ablation model of the US National Weather Service (US NWS) applied on a medium-sized mountainous catchment (the Mesochora catchment in Central Greece) was used as input to ANN model. The nonlinear ANN model is shown to provide comparable representation of the rainfall-runoff relationship to the conceptual soil moisture accounting model of the US NWS applied over the same catchment. Because the ANN model developed here has not physically realistic components and parameters, it is by no means a substitute for a physically based conceptual model. The ANN approach can provide a viable and effective alternative for input-output modeling and forecasting models in cases that do not require modeling of the internal dynamics of the catchment.