Application of chosen black box models for flood forecasting purposes in the small basins

P. Maca, J. Redinova, M. Hanel, S. Horacek, Z. Kulhavy, M. Hermanovsky, V. Havlicek, J. Pavlasek

Department of Water Resources and Environmental Modeling, Faculty of Environmental Sciences, CULS Prague

Selected black box prediction models have been applied for the purposes of flood forecasting in several small basins. Analyzed catchments are situated in the Czech republic. The main emphasis was put into the development and application of the simple forecasting model, which can be used as a prediction tool in local warning systems. The linear black box model Q–P and nonlinear prediction model based on neural network theory were used for the purposes of short time flood forecasting. The linear model Q–P follows simple transfer function models and nonlinear model has a structure of multilayer perceptron. Previously recorded precipitation and discharges intervals with different lengths served as model inputs. Models have been tested using the set of 180 historical flood events with different magnitude, duration, return period, maximum and others hydrograph characteristics. The highest return period of studied flood events was 50 years. These flood events have been selected from 16 basins, whose areas ranges from 0.1 to 255 km^2. Time resolution of studied flood events were 10–, 20–minutes and 1 hour. Different calibration strategies have been tested. Calibration set with chronologically sorted flood events and calibration sets with unsorted data were compared in the validation phase. Promising results indicate necessary requirements for tested black box models implementation in flood forecasting systems. Chosen variants of linear transfer models function were successfully applied in real time discharge prediction on 3 experimental basins in eastern Bohemia. Finally newly derived black – box models will be used as a component of local warning system.