



An impact of environmental changes on flows in the reach scale under a range of climatic conditions

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The present paper combines detection and adequate identification of causes of changes in flow regime at cross-sections along the Middle River Vistula reach using different methods. Two main experimental set ups (designs) have been applied to study the changes, a moving three-year window and low- and high-flow event based approach. In the first experiment, a Stochastic Transfer Function (STF) model and a quantile-based statistical analysis of flow patterns were compared. These two methods are based on the analysis of changes of the STF model parameters and standardised differences of flow quantile values. In the second experiment, in addition to the STF-based also a 1-D distributed model, MIKE11 was applied. The first step of the procedure used in the study is to define the river reaches that have recorded information on land use and water management changes. The second task is to perform the moving window analysis of standardised differences of flow quantiles and moving window optimisation of the STF model for flow routing. The third step consists of an optimisation of the STF and MIKE11 models for high- and low-flow events. The final step is to analyse the results and relate the standardised quantile changes and model parameter changes to historical land use changes and water management practices. Results indicate that both models give consistent assessment of changes in the channel for medium and high flows.

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