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The stochastic discharge forecast – creation, interpretation and other applications

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Abstract The deterministic discharge forecast calculated by hydrological models is now a common product of the Flood Forecasting Service in the Czech Republic. However, the deterministic forecast does not describe the determination which must be considered not only during the creation of the flow forecast, but mainly within the interpretation of the final predicted hydrograph. The deterministic forecast is a great simplification of the real conditions in the catchment taking into account only one possible (although the most probable) scenario of the future development of the meteorological and hydrological situation. The stochastic flow forecast based on simulation of many probable meteorological scenarios (all members of the meteorological ensemble) aims to describe the spread of the possible flow developments during the predicted period. The paper describes the generator of the random fields of meteorological quantities – the inputs of the hydrological model. The sets of precipitation, temperature and snow fields cover the estimated uncertainty of the measured and predicted quantities. The coinciding set of discharge forecasts is then evaluated. The case studies of floods which hit the Dyje catchment in 2002 and 2006 show the application of the proposed method. Whereas the stochastic flow forecast is not very common in operation, attention is also paid to the correct interpretation of the stochastic flow forecast and to other uses of this product. The method has been tested in operation in the Dyje catchment since 2009, within the Flood Forecasting Service ensured by the Czech Hydro-meteorological Institute.

Key words flood; operative discharge forecast; stochastic forecast; Monte Carlo