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Soil and Water Research

The real-time stochastic flow forecast

Březková L., Starý M., Doležal P.:

Soil & Water Res., 5 (2010): 49-57

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In the Czech Republic, deterministic flow forecasts with the lead time of 48 hours, calculated by rainfall-runoff models for basins of a size of several hundreds to thousands square kilometers, are nowadays a common part of the operational hydrological service. The Czech Hydrometeorological Institute (CHMI) issues daily the discharge forecast for more than one hundred river profiles. However, the causal rainfall is a random process more than a deterministic one, therefore the deterministic discharge forecast based on one precipitation prediction is a significant simplification of the reality. Since important decisions must be done during the floods, it is necessary to take into account the indeterminity of the input meteorological data and to express the uncertainty of the resulting discharge forecast. In the paper, a solution of this problem is proposed. The time series of the input precipitation prediction data have been generated repeatedly (by the Monte Carlo method) and, subsequently, the set of discharge forecasts based on the repeated hydrological model

simulations has been obtained and statistically evaluated. The resulting output can be, for example, the range of predicted peak discharges, the peak discharge exceeding curve or the outflow volume exceeding curve. The properties of the proposed generator have been tested with acceptable results on several flood events which occurred over the last years in the upper part of the Dyje catchment (Podhradí closing profile). The rainfall-runoff model HYDROG, which has been in operation in CHMI since 2003, was used for hydrological simulation.

Keywords:

discharge forecast; flow; hydrological model; Monte Carlo; operative hydrological forecast; rainfall-runoff model; stochastic

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