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Hydrologic flow routing for flow forecasting in Central and East Slovakia

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The attenuation of floods is often influenced by the changes of the riverbeds after large floods. In such cases the lack of sufficient and up-to-date channel geometry and roughness data may hinder the application of hydraulic flow routing in flood forecasting especially in less developed regions. Field investigations are often prohibited by time schedules and costs and it is likely that this situation may remain such even over the long-term. Under such conditions, as a rational alternative to hydraulic routing, hydrological routing models appear to be a suitable in the practice for flow forecasting. These models (and also models belonging to the class of non-storage routing methods), are being implemented into operational use also in Slovakia. The morphological and hydraulic characteristics of the modelled river reaches and of the flow conditions are reflected in the routing model parameters of these models, which are estimated by calibration and are kept constant for a given model during the simulation. This contribution presents several case studies of a new hybrid concept of model parameterization of the discrete state-space representation of the cascade of linear reservoirs. The model parameters change according to relationships between the travel time of flood peaks and discharge and other selected characteristics of the flood wave (e.g. slope of the rising limb of the hydrograph, intensity of lateral inflow). These relationships were obtained from empirical data, and also by genetic optimization of the flood routing model's performance on a small set of floods, respectively. It was shown that the relationships detected by the genetic optimisation exhibit the same behaviour as those gained from the empirical data. The practical applicability of the concept was tested on the Laborec River between Krásny Brod, on the Torysa River between Brezovica – Sabinov and on the Hron River between Brezno – Banská Bystrica.