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Effects of rainfall – runoff model structure and rainfall spatial model on hydrological flood forecasting

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Recent advances in simulation of discharges have been based on the use of distributed hydrological model approaches that take account of the spatial variability of rainfall and physical features of the basin. In this paper, we identify some effects in the simulated discharges induced by changes in the structure of the rainfall-runoff models used in the simulation and by type of rainfall fields used as input.

For the assessment of rainfall-runoff model structure uncertainty, two distributed models were applied and compared on the same watershed: the first is based on a coupled Topmodel-SCS approach (DiCHiTop), the second model consists of a piecewise linear approximation of non linear soil moisture processes based on conceptual approaches (WBrM).

Also, different types of estimated rainfall fields were used to assess the sensitivity of hydrographs to rainfall spatial structure. Observed discharges were therefore compared with simulated discharges obtained using firstly only rain gauge data, secondly only radar fields and finally merged radar – rain gauge rainfall fields. Each model was calibrated independently for each type of rainfall field over the same set of events. In this way, models can adjust its estimations according with the particularities of each type of rainfall field changing its parameters.

First results show that discharge simulations using as input rainfall fields that take account the spatial variability of rainfall (i.e., radar, or merged radar-rain gauge fields) had the highest performances in both calibration and validation events. WbrM model

gave highest performances in calibration, but in validation its performance fell behind DiCHiTop simulations.