Precipitation as a main source of uncertainty in rainfall-runoff models

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Uncertainty of simulated runoff is mainly the result of precipitation uncertainty associated with the basin average precipitation. Therefore it is very important to assure the accurate precipitation input, whether from raingauges or other sources such as radar measurements or meteorological forecast. The significant problem with raingauge network is the inability to determine the areal patterns of precipitation or to identify the heaviest amounts. The accurate estimation of mean areal precipitation depends on the number of raingauges on the catchment and is usually not dense enough for small catchments and high temporal resolution. The influence of number of raingauges on areal estimation of precipitation for the Savinja catchment was investigated. On the other hand, radar provides coverage over a large area with high spatial and temporal resolution. Radar measurements are great source of data which could be used as input into rainfall-runoff models. Areal estimations of radar precipitation were performed for two high water events on the Savinja River. Results show great uncertainty of these data as input in rainfall-runoff models. The correction of current radar data with ground rainfall measurements is needed.

For operational flood forecasting the predicted precipitation is input into the rainfall-runoff models. The results of half-yearly runs of HBV-96 model for the Savinja catchment are demonstrated using the meteorological forecast of ALADIN/SI model as input into the catchment model. The deviation of simulated discharge from measured one can be very large, especially for the mountainous part of the catchment. The deviation of runoff is the result of uncertainty of predicted precipitation. The analysis of the sensitivity of conceptual rainfall-runoff models to error in precipitation input has shown that an error in rainfall causes much larger error in simulated runoff. For example, an error of 10% in the amount of overestimated precipitation overestimates the peak discharge of flood wave for about 17%.