



Areal rainfall estimation for hydrological modelling and flood forecasting

M. Kobold (1,2), M. Brilly (2), A. Zgonc (1)

(1) Environmental Agency of the Republic of Slovenia, Ljubljana, Slovenia, (2) Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia (mira.kobold@gov.si)

Uncertainty of simulated runoff is mostly the result of precipitation uncertainty associated with the average basin precipitation. The estimation of areal precipitation from point precipitation measurements is dependent on time scale and catchment scale, density of precipitation network, distribution of precipitation stations and variability of precipitation. The high intensity of precipitation of short duration to few hours is critical for floods in Slovenia, where the general problem is sparse recording raingauge network. The complexity of rainfall-runoff models and modelling of phenomena on small catchments require the accurate information both in space and time.

The primary input data in conceptual rainfall-runoff models are point precipitation data. The HBV model calculates the areal precipitation with weights which are usually determined by the method of Thiessen polygons. The influence of number of raingauges to give proper areal precipitation was investigated for the Savinja catchment. The research was specially focused on the number of recording raingauges on the catchment for modelling with short time steps. The results show that the estimation of areal precipitation for the Savinja catchment is very uncertain taking into account only recording raingauges and the method of Thiessen polygons. The areal precipitation can be rather overestimated or underestimated, for precipitation caused high waters and floods even to 50%. The deviations are greater for mountainous parts where the variability of precipitation is higher. Incorrect estimation of areal precipitation further leads to great deviation of simulated discharge. A proposal of number and distribution of recording raingauges on the Savinja catchment was performed. While existing point precipitation measurements do not assure the accurate areal precipitation for flash flood modelling, the applicability of present radar precipitation from the weather radar located near the Savinja catchment was analyzed. It has been shown

that the radar precipitation is underestimated and it should be corrected with ground rainfall measurements for using it in hydrological modelling.

For operational flood forecasting the predicted precipitation of meteorological models is input into the rainfall-runoff models. The analysis of uncertainty of predicted precipitation of the ALADIN/SI model covering Slovenia shows that the model predicts the rainfall event well, but the amount of precipitation is very uncertain and it is either underestimated or overestimated.