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Operational event based flood forecasting with emphasise on the estimation of the initial state conditions

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For the Austrian province of Lower Austria an event based operational flood forecasting system was developed and tested for small basins with areas of 50 to 300 km^2. The main objectives of the model development focus on the items (i) provision of reliable forecast of peak discharge and peak occurrence time in terms of prewarning levels, (ii) application of simple approach to facilitate easy data handling and parameterisation, (iii) transferability of concepts between gauged and ungauged basins and (iv) potential for assessment of the model and forecast uncertainties. In a pre-feasibility study a dynamic unit hydrograph (UH) concept was introduced. The difference of the dynamic UH concept in comparison to the standard method is the assumption of a variable UH shape (length and ascending limb) with respect to the temporal variation of the basin state conditions (antecedent moisture content) and rain event characteristics. For the estimation of the preliminary UH shape also geomorphological data like length of flow path and slope - which can be estimated by means of digital elevation model (DEM) - were applied.

The operational estimation of the loss parameters and variable runoff coefficients are also related to state parameters like the antecedent rain index at the beginning and at the end of the rainfall event, the rainfall intensity, rain accumulation and the time of the year. Threshold values of potential runoff coefficient were related to basin land use, seasonal effects and geology. The quantitative rainfall for the operational forecast is provided by the Austrian meteorological survey and is based on radar nowcast data and forecasts from the ALADIN limited area meteorological model. Obviously

the reliability of the quantitative rainfall forecast has a primary effect on the model performance but this will not be discussed explicitly in the poster.

The preliminary results of the selected test basins are promising and approve the model design to be appropriate for runoff forecast purposes. The emphasis was the forecasting of runoff categories in terms of prewarning levels. The warning levels were assumed to coincide with the 1, 5, 30 and 100 years frequency. The quantitative data can be provided as an ensemble forecast, which varies the quantities of the model input and the derived data like the state conditions. The effect can be visualised as confidence thresholds and enable a profound decision making for the responsible authorities.