



Operational flood forecasts for the Mur and Enns catchment in Austria - experiences from the June 2009 double flood event

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Flood forecasting performance of two Austrian operational systems is evaluated in this paper using recorded data from the June 2009 double flood event. The Mur and Enns are mountainous rivers in Styria. Significant rainfall variability in both catchments is observed and hence major tributaries are included in the setups for a better description of spatial flood formation processes. Regarding the general system structure, both systems are mostly identical: flow forecasts are delivered automatically every hour using the MIKE11 hydrologic and hydrodynamic modelling modules and the MIKEFLOODWATCH shell. In both systems, hourly rainfall fields are provided on a $1 \times 1 \text{ km}^2$ grid by the meteorological service in Austria, ZAMG. Forecast lead time is 48 hours. For the Mur system, an automatic data assimilation module is implemented, so that discharges observed at the main gauging stations can be used to correct the simulations. In June 2009, two events occurred in Styria within a period of less than a week. The larger event at the Mur had a return period of 4 years and at the Enns, a return period of 8 years. Analyses of the forecast quality show significant differences between (1) the two events, (2) the two catchments and (3) the different forecast points. Additionally, automatic forecast correction did not improve the results in every case. Several reasons for these discrepancies from different parts of the forecast system could be determined, but it was not possible to define systematic error characteristics. The flood forecast evaluation at the double event shows the urgent need for expert judgement during a flood event in order to interpret the results and correct or modify erroneous data. This will significantly increase the forecast reliability, and thus increase the possibilities of using the system as a support tool in flood risk management.