The hydrological application of radar rainfall nowcasting in the Netherlands

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The high temporal and spatial variability of rainfall fields make that they are difficult to predict. Good predictions of rainfall for the first hours can be very useful in operational flood forecasting. To make such predictions of rainfall, radar rainfall nowcasting techniques can be used.

This study applied radar rainfall nowcasting for discharge predictions for several lowland catchments. Deterministic (Lagrangian persistence) and probabilistic (SBMcast) techniques were used to produce rainfall forecasts based on radar imagery. These rainfall forecasts were used as input for the hydrological model WALRUS.

In terms of rainfall, the forecasts got worse with increasing forecasting time, with most often an underestimation of rainfall. The results showed that the discharge could be forecasted between 25 and 170 minutes earlier than without rainfall nowcasting, with the best performance for the largest catchment. With respect to the catchment response time, the best performance was found for the smallest catchment, but that was also the most variable. The probabilistic nowcasting effectively showed the uncertainty of the rainfall and discharge predictions. The uncertainty in rainfall predictions was shown to be largest for smaller catchments. Moreover, the ensemble forecasts effectively showed the uncertainty in how much earlier the discharge could be forecasted. This uncertainty ranged between 15 and 50 minutes.

To apply radar rainfall nowcasting in operational flood forecasting better real-time radar products need to be developed to overcome the rainfall bias and the performance of the nowcasting techniques has to be tested for more events and catchments.