



Flash-flood early warning using weather radar data: from nowcasting to forecasting

Katharina Liechti (1), Luca Panziera (2), Urs Germann (2), and Massimiliano Zappa (1)

(1) Swiss Federal Research Institute WSL, Birmensdorf, Switzerland, (2) MeteoSwiss, Locarno Monti, Switzerland

In our study we explore the limits of radar-based forecasting for hydrological runoff prediction. Two novel probabilistic radar-based forecasting chains for flash-flood early warning are investigated in three catchments in the Southern Swiss Alps and set in relation to deterministic discharge forecast for the same catchments. The first probabilistic radar-based forecasting chain is driven by NORA (Nowcasting of Orographic Rainfall by means of Analogues), an analogue-based heuristic nowcasting system to predict orographic rainfall for the following eight hours. The second probabilistic forecasting system evaluated is REAL-C2, where the numerical weather prediction COSMO-2 is initialized with 25 different initial conditions derived from a four-day nowcast with the radar ensemble REAL. Additionally, three deterministic forecasting chains were analysed. The performance of these five flash-flood forecasting systems was analysed for 1389 hours between June 2007 and December 2010 for which NORA forecasts were issued, due to the presence of orographic forcing.

We found a clear preference for the probabilistic approach. Discharge forecasts perform better when forced by NORA rather than by a persistent radar QPE for lead times up to eight hours and for all discharge thresholds analysed. The best results were, however, obtained with the REAL-C2 forecasting chain, which was also remarkably skilful even with the highest thresholds. However, for regions where REAL cannot be produced, NORA might be an option for forecasting events triggered by orographic forcing.