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FLASH FLOOD EARLY WARNING USING ENSEMBLE WEATHER FORECASTS

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Abstract

Focus of this work is to test a hydrometeorological simulation framework for a flash flood early warning system based on probabilistic weather forecasts. Limited area Ensemble Prediction System (LEPS) provided by the COSMO Consortium are used as meteorological inputs into a distributed hydrological model. Initial conditions are taken from the coarser, 5-km operational run of the European Flood Alert System (EFAS) of the European Commission. When a signal for possible flash flooding is detected across Europe, a catchment simulation is run on a fine spatial scale (1 km grid resolution). Forecasted ensemble hydrographs, with lead time of 5.5 days, are estimated and results are compared to a reference climatology run. Coherent reference climatology is obtained through hydrological simulation of a continuous meteorological dataset based on 30-year COSMO-LEPS hindcasts. This is particularly useful for flash flood events, as they often take place in small watersheds, where no gauge measurement is available.

Continuous simulations are carried out over a 17-month time span for a Swiss catchment and prediction skill is evaluated for different forecast lead time. The concept of persistence of meteorological forecasts is also tested as a way to improve the detection of severe events.

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First results look promising for future operational implementation as a flash flood early warning system. However, further analyses and comparisons with observed events is recommended, as particular care is to be put in the choice of alert thresholds.