



## **Coupled meteorological-hydrological early flood warning for Alpine catchments**

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Floods remain one of the most frequent and devastating natural hazards worldwide. Due to the extremely fast response of river runoff to precipitation events, early flood warning in Alpine catchments can only be achieved by coupling short to mid-range precipitation forecasts through numerical weather prediction (NWP) to hydrological models.

Our investigations focus on a coupled meteorological-hydrological early flood warning system, developed for alpine catchments and applied to the catchment of the river Ammer (710 km<sup>2</sup>) in Upper Bavaria, Germany.

The meteorological part of the coupled models system consists of numerical weather prediction (NWP) by the Mesoscale Model MM5 that is used for an operational 72h prediction twice daily down to a resolution of 3.75 km. Additionally, the Weather Research and Forecast (WRF) Model is used for ex-post forecasts down to 2 km. Both limited area models are driven with Global Forecasting System (GFS) input data. The distributed hydrological water balance model WaSiM is used in 100 m resolution and hourly time steps allowing to transform the meteorological forecast into a river runoff prediction.

Setup and evaluation of the weather forecast as well as of the coupled flood warning system are presented with a focus on the flood in August 2005, which has caused century floods in headwaters of Switzerland, Austria and Germany and has led to tremendous economic damage. Additionally, sensitivities of different model setups, parameterization schemes and horizontal grid resolutions on forecasted precipitation and river discharge are presented.