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A flash flood forecasting system based on high-resolution ensemble precipitation nowcasting

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Abstract

This study looks at the benefits of using precipitation nowcasting techniques to trigger and force a fully-distributed, event-based flash flood forecasting system. The system takes advantage of recent developments in both nowcasting and hydrological modelling, thus representing a truly interdisciplinary effort to improve warnings for high impact weather in Alpine regions and in particular for small ungauged basins.

Hourly rainfall accumulations over the target basins are monitored in real-time by an operational alert system at MeteoSwiss (NowPAL, Panziera et al. 2016). The exceedance of a predetermined threshold triggers the hydrological forecast by using the novel process-oriented distributed runoff module RGM-PRO (Antonetti et al. 2017) as initialized by operational gridded information on antecedent soil moisture condition provided by the PREVAH hydrological model.

The hydrological simulation is forced with ensemble precipitation nowcasts from a seamless forecasting system that is tailored to optimally combine the information and respective uncertainty from multiple sources such as radar observations and short-range NWP forecasts. The system was recently developed to address the challenges of forecasting extreme precipitation in an Alpine context. In particular, these requirements include the need for localization and the formulation of a representative model of the forecast error.

We will illustrate the full forecasting chain, explain the individual components and present first results from selected case studies.

References

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