



Local short-duration precipitation extremes in Sweden: observations, forecasts and projections

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Local short-duration precipitation extremes (LSPEs) are a key driver of hydrological hazards, notably in steep catchments with thin soils and in urban environments. The triggered floodings, landslides, etc., have large consequences for society in terms of both economy and health. Accurate estimations of LSPEs on both climatological time-scales (past, present, future) and in real-time is thus of great importance for improved hydrological predictions as well as design of constructions and infrastructure affected by hydrological fluxes.

Analysis of LSPEs is, however, associated with various limitations and uncertainties. These are to a large degree associated with the small-scale nature of the meteorological processes behind LSPEs and the associated requirements on observation sensors as well as model descriptions. Some examples of causes for the limitations involved are given in the following.

- Observations: High-resolution data sets available for LSPE analyses are often limited to either relatively long series from one or a few stations or relatively short series from larger station networks. Radar data have excellent resolutions in both time and space but the estimated local precipitation intensity is still highly uncertain. New and promising techniques (e.g. microwave links) are still in their infancy.
- Weather forecasts (short-range): Although forecasts with the required spatial resolution for potential generation of LSPEs (around 2-4 km) are becoming operationally available, the actual forecast precision of LSPEs is largely unknown. Forecasted LSPEs may be displaced in time or, more critically, in space which strongly affects the possibility to assess hydrological risk.
- Climate projections: The spatial resolution of the current RCM generation (around 25 km) is not sufficient for proper description of LSPEs. Statistical post-processing (i.e. downscaling) is required which adds substantial uncertainty to the final result. Ensemble generation of sufficiently high-resolution RCM projections is not yet computationally feasible.

In this presentation, examples of recent research in Sweden related to these aspects will be given with some main findings shown and discussed. Finally, some ongoing and future research directions will be outlined (the former hopefully accompanied by some brand-new results).