Spatial interpolation of hourly cumulated precipitation in Norway

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MET Norway is developing a spatial interpolation method for hourly cumulated precipitation using data from automatic weather stations. Currently, around 150 hourly observations are available for the whole Norway. The goal is to create a dataset of hourly precipitation fields, updated at least on a daily basis, together with an uncertainty evaluation. The dataset will be used in: climate, hydrology and meteorology. Furthermore, the interpolation procedure will result in a useful tool for data quality control.

The spatial interpolation begins with the identification on the grid of simultaneous observed areas of precipitation, followed by the statistical interpolation on each area considered as independent from the others. The statistical properties of the field are allowed to change between different observed areas of precipitation. Eventually, the analysis field is a composition of several precipitation events, which are considered individually.

In each individual area of observed precipitation, the statistical interpolation is based on a scale-separation concept. First, the aim is to include in the field effects that are observed by many stations, or "larger" (compared to the station density) scale effects. Second, local-scale effects are included on the 1Km high-resolution grid using the larger-scale field as a background. The statistical interpolation scheme is based on Optimal Interpolation and the parameters are optimized independently for each precipitation event by minimizing the deviations between cross-validated analysis and observed values.

The evaluation has focused both on significant case studies and on average skill measures using one recent year of data. In fact, it is important to assess the dataset quality for high-impact weather because of the possible use of the dataset in near-real time emergency response.