

Investigating local extreme value statistics based on 10 years of radar observations

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For the design of hydrological structures, results from extreme value statistics of long time series (> 30 years) of rain gauge measurements are traditionally used in hydrology. These statistics are not necessarily available for locations where they are required.

Radar data have now been observed in Germany for more than 10 years, and so first statistical comparisons between rain gauge and radar observations can be performed. For four rain gauge locations in the Wupper area, radar time series have been analysed. For each location, statistics were derived from

- 9 pixels: the central pixel containing the rain gauge and the eight surrounding ones;
- 2 to 3 radar sites: all radar measurements covering the rain gauge location;
- 1 composite from three radars;
- 2 adjustments methods: both based on daily adjustment with an IDW scheme, one with and the other one without image interpolation (advection scheme);
- 4 time aggregations: for each analysis four time aggregations were analysed for the statistics: 5, 15, 30 and 60 minutes.

Uncertainties are present in many of the measurement processing steps for both, radar and rain gauge measurements. These are explained.

Results show that

- although often events at the rain gauge and the radar are different ones, the resulting extreme value statistics may be very similar,
- spatial statistics of single extreme events perform different than statistics from connected single pixels,
- statistics for shorter time intervals (5 min, 15 min) show a much higher spread between the nine pixels than the two longer time intervals,
- the adjustment method with the advection scheme provides results with the lowest spread between the pixel results,
- none of the single radar sites is able to provide statistics which give a narrow uncertainty bandwidth for extreme values,
- the standard deviation of the nine pixels can be large, especially for rare events.