

Investigating the Spatial Extent of Extremes in Hydrology

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Overview

1 Motivation

2 Precipitation data

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Research questions

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Research questions

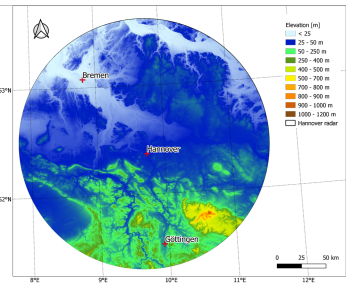
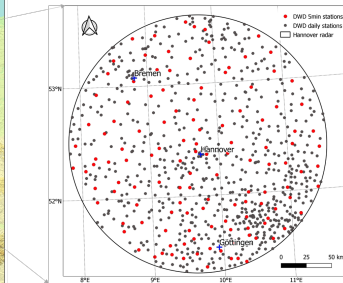
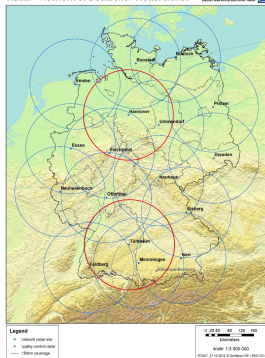
1. How can we move from point statistics to a space-time description of extremes?

Precipitation data

Spatial observations - Weather radar data

- Radklim weather radar data provided by the DWD from 2000-2019 (5 minutes)
- Raw reflectivity data for radar areas of Hannover and Tuerkheim

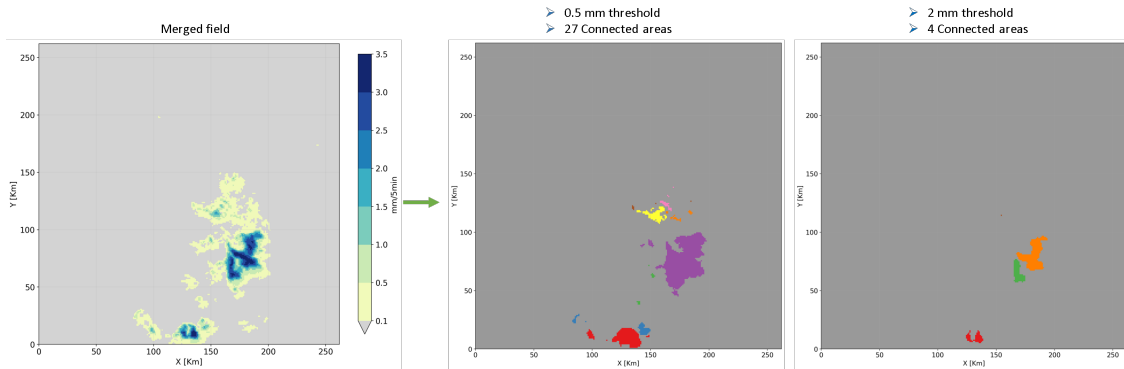
Radar - Network of Deutscher Wetterdienst



Weather radar network operated by the DWD and location of the stations within the radar area of Hannover along the digital elevation model of the radar area.

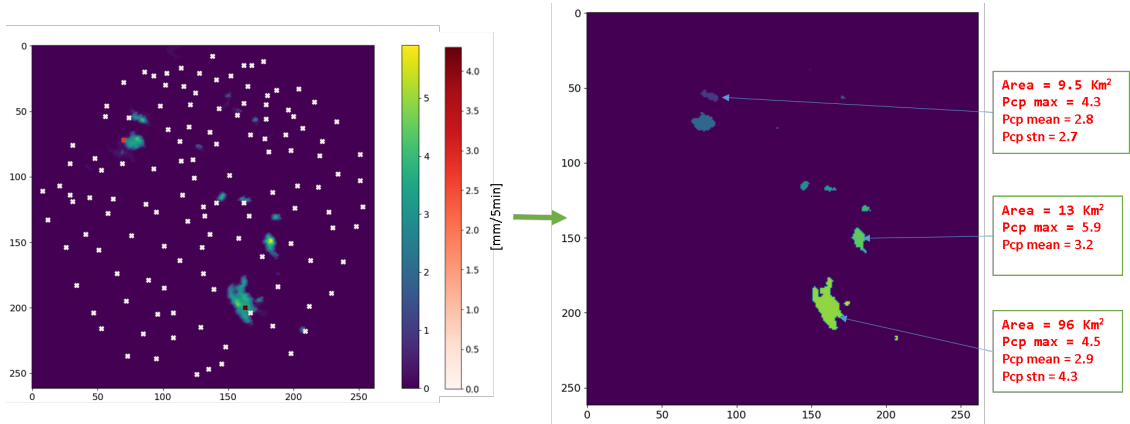
Spatial extent

Deriving connected areas from radar data



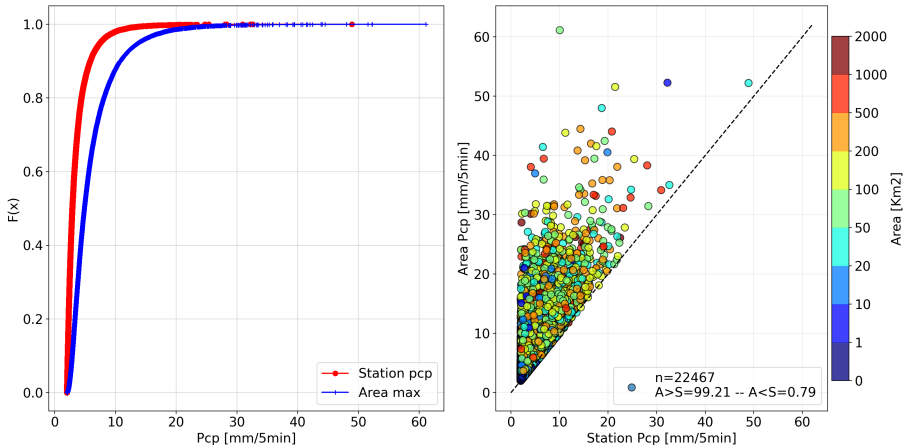
Example of derived connected areas from the merged field for two different thresholds.

Derive connected area size and mean precipitation value



Example of derived connected areas and corresponding statistics from one field using a threshold of 2 mm/5min.

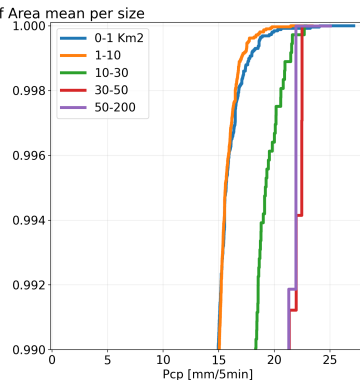
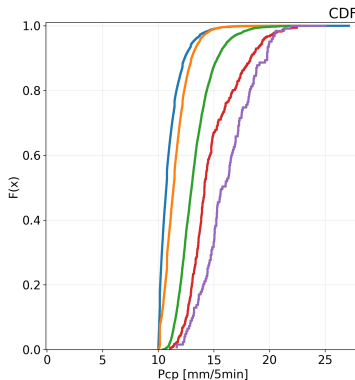
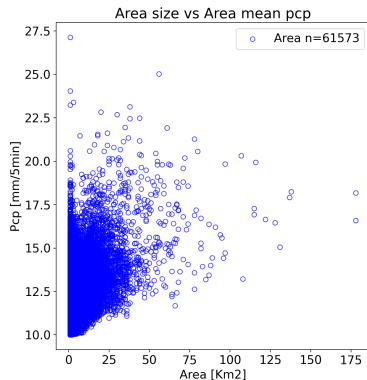
Are station data representative of areal maximum using a threshold of 2 mm/5min?



Left plot shows the CDF of the station (red) and the areal (blue) maxima within the same area. The right plot shows a scatter plot of the two maxima.

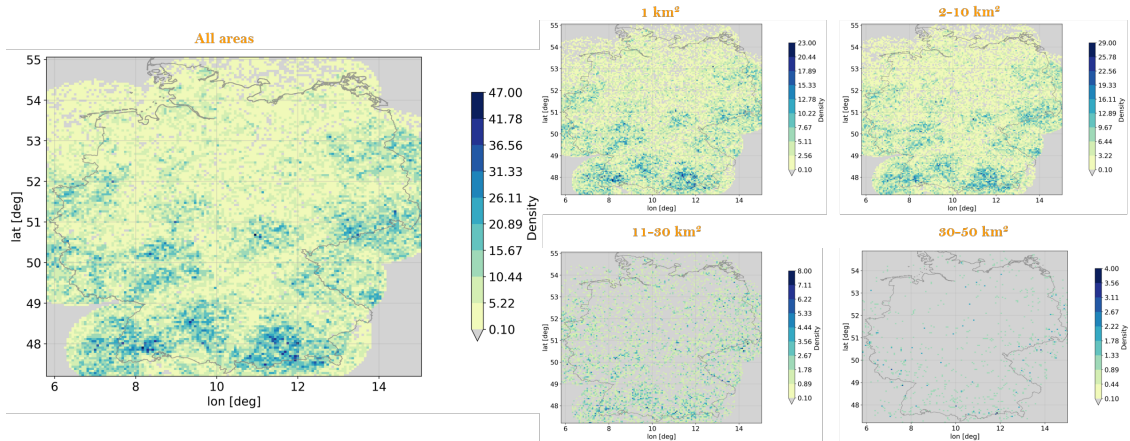
Areal mean vs areal extent using a threshold of 10 mm/5min?

→ The larger the area the larger the mean. → The largest intensities are for areas 30-50 km^2



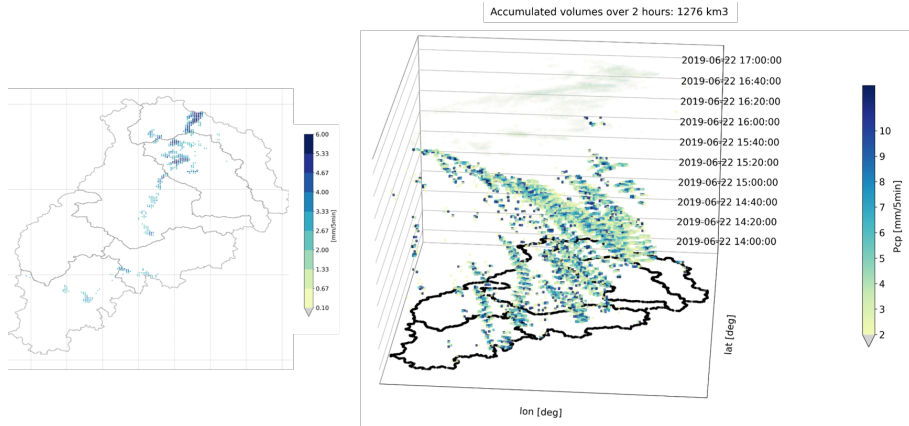
Left plot shows the area size versus the areal mean precipitation. The right plot shows the areal precipitation CDF corresponding to each area size.

Spatial density of continuous areas for thresholds of 10 mm/5min



Density of location of continuous areas above 10mm / 5min and divided by area size.

Spatial areas in a space-time dimension (3D)



Example of 2D and 3D accumulation of continuous areas of the Neckar catchment.

The End

Thank you for your attention