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Extreme precipitations measured by radar

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Radar measurements provide information on precipitation in space and time. They do not measure precipitation but reflectivity. The transformation to precipitation is not straightforward. The result is that different, partly random, partly systematic errors may occur. Radar precipitation pixels are usually considered to measure the mean over a large area of 500 x 500 m. However the measurement itself is represented in polar coordinates and is subsequently transformed to a Cartesian system. As the measurements in the polar coordinate system deliver areal averages corresponding to different block sizes this is likely to have an effect on the estimates of the true precipitation values. This particularly applies to extremes. In the outer circles of the radar scan the blocks are bigger, and thus the measurements deliver areal extremes where a kind of area reduction factor is the result of the resolution. In order to investigate the influence of this on the extremes two numerical simulation examples were considered. Results from a long high resolution simulation using the String of Beads model applied with data from South Africa, and of a copula based direct simulation, are analysed and presented. The results show that the extremes towards the outer ring of the radar observations may, under stationary conditions, be reduced by up to 20 %.