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Stochastic modeling of post-frontal shower cells

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At first glance the structure of a post-frontal precipitation field with its scattered shower cells seems to be very chaotic. Nevertheless, this chaotic structure follows simple laws, such as a power law for per-cell reflectivity maxima. These have been determined in the past based on ground based radar observations over northern Germany.

Now, those determined spatial and temporal characteristics, such as the diurnal variation of the average number of cells, the temporal peak number development, the rain area size distribution and its temporal development, are used to develop a stochastic shower model. The model is able to simulate the mean precipitation field under post-frontal conditions for a given area and time period. This includes several shower cell stages such as genesis, growing and dissolving, merging and splitting of shower cells as well as the transport with the mean wind.

We show some potential uses of the shower model results. That could be as input for catchment area rain estimations under post-frontal conditions, for calculations of extreme events or for flooding risk assessments.
An overview will be given about the concept of the shower model and its current status.