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Impact of microphysical uncertainty on the evolution of a severe hailstorm

Patrick Kuntze[1], Annette Miltenberger[1], Corinna Hoose[2], Michael Kunz[2], and Lena Frey[2]
[1]Johannes Gutenberg-University Mainz, Institute for Atmospheric Physics, Mainz, Germany
[2]Karlsruhe Institute of Technology (KIT), Institute of Meteorology and Climate Research, Karlsruhe, Germany

Forecasting high impact weather events is a major challenge for numerical weather prediction. Initial condition uncertainty plays a major role but so do potentially uncertainties arising from the representation of subgrid-scale processes, e.g. cloud microphysics. In this project, we investigate the impact of these uncertainties on the forecast of cloud properties, precipitation and hail of a selected severe convective storm over South-Eastern Germany.

Here, we focus the investigation on the effects of parametric uncertainty in a perturbed parameter ensemble, using the ICON model (with 2-moment cloud scheme, at 1 km grid spacing). A latin hypercube sampling is used to generate systematic variations of selected microphysical parameters from an eight-dimensional parameter space. Considered processes include riming, diffusional growth of ice and snow, CCN and INP activation, as well as the mass-diameter and mass-velocity relations. Isolated sensitivity experiments show distinct influences of all parameters on hail related variables, where the strongest impacts are found in simulations with reduced CCN and INP activation. We will present a detailed analysis of the simultaneous influence of parameter perturbations on the cloud microphysical evolution of the storm.