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Sensitivity experiments with ICON-ART for the Andreas hail storm on the Swabian Jura

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The prediction of hailstorms is highly uncertain, not least since various processes involved act on different scales. We investigate the representation of hail events in the numerical weather prediction model ICON coupled with the aerosol module ART (ICON-ART). Furthermore, we evaluate the relative contributions from aerosols, microphysical parameters and environmental conditions to the uncertainty in cloud-, precipitation- and hail parameters for severe hail events.

Our case study investigates the Andreas storm on the 28th of July over Southern Germany, causing severe damage. We perform model simulations on cloud-resolving scale and compare the model output with satellite and radar observations. The focus of our analysis is on the representation of storm tracks, total precipitation and the hail production rate in the model.

Also, we are in the process of developing a statistical emulator. In order to identify possible input parameters for the emulator, sensitivity simulations with the model have been performed. Five input parameters have been selected, namely the CCN and IN concentrations, the riming efficiency, the CAPE and wind shear. The model response to changes of these sensitivity parameters will be presented. Further, we will present first results from the ensemble model simulations, which will be used to build the emulator.