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Simulations of hailstorms over Switzerland in a warmer climate, using a surrogated climate change approach

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The WRF model was used for simulating the hailstorms over Switzerland in summer periods of 2012, with 2-km horizontal resolution and using the ECMWF analysis for boundary forcing. The climate conditions, expected towards the end of the XXI century (RCP85 scenario) were simulated by introducing biases of air temperature and of soil temperature/water content, based on CMIP5 simulations. The relative air humidity was left constant in one experiment and let to change, following the CMIP5 simulations, in the second configuration.

Based on the comparison with the unbiased present day simulation, changes in spatial and temporal distributions of precipitation patterns and of hailstorms, in characteristics of thunderstorm clouds and in parameters of ground-reaching hailstones were studied. Considerable increase of mean and maximal precipitation rate has been remarked. More hail days, more frequent hailstorms and larger hailstones were produced in the climate change simulations. The air humidity conditions, set in the surrogated climate change runs, strongly influence the hailstorm activity in the future climate.