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Numerical simulation of convective squall lines over Southwest England with detailed microphysical scheme

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The Convective Precipitation Experiment (COPE) was established to investigate the dynamical and microphysical properties of severe storms and squall lines through their entire life-cycle. During 3rd August 2013 two convergence lines developed parallel to the coastlines of the Southwest Peninsula of the United Kingdom in southwesterly flow and in absence of synoptic fronts. Convective storms developed along the two lines and produced precipitation during the day. Similar conditions, with however more stationary cells, have produced flash floods in this area previously. Such conditions are difficult to forecast and with one major uncertainty relating to role of ice processes, in particular ice multiplication, in the formation of precipitation.
Numerical simulations have been conducted using a detailed (bin) microphysics scheme to reveal the role of the different microphysical processes on the formation of precipitation in this case. Simulations were made with the Advanced Weather Research and Forecast (WRF) model, using 500×500 grid points in the horizontal directions with 1 km grid spacing, and 71 stretched vertical levels up to 40 km. The simulated time period was 12 hours. Two sets of simulations were made, with and without the Hallett-Mossop ice formation process to investigate the effect of this microphysical ice formation on the amount and intensity of precipitation.