



Supplement of

The effect of secondary ice production parameterization on the simulation of a cold frontal rainband

Sylvia C. Sullivan et al.

Correspondence to: Sylvia C. Sullivan (scs2229@columbia.edu), Athanasios Nenes (athanasios.nenes@epfl.ch) and Corinna Hoose (corinna.hoose@kit.edu)

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Figure S1. Panel a shows the observed radar reflectivity as in Fig. 4. Panels b, c, and d show the simulated radar reflectivity from the RS1, DS1, and BR1ig simulations respectively.



Figure S2. Panel a shows the spatial distribution of precipitation rate in the RS1 simulation for a subdomain centered at CFARR between 18:00 and 18:30 UTC, as the rainband begins to pass over the UK. Panels b though f show the deviations of precipitation rate in five of the simulations with the secondary ice parameterizations in place.



Figure S3. Temporal evolution of N_{ice} (panels a, b, c) and N_{pri} (panels d, e, f) profiles in the RS1 simulation from three, randomly-sampled latitude / longitude locations in the vicinty of CFARR. Eight profiles are shown for each location, one for each half hour from 18:00 UTC to 21:30 UTC with the darker colors representing earlier times and the lighter ones later times.



Figure S4. Temporal evolution of N_{ice} and N_{pri} profiles as above but for the RS1 simulation from three, randomly-sampled latitude / longitude locations in the vicinity of CFARR.



Figure S5. Graupel mixing ratio (a), snow mixing ratio (b), large-scale graupel quantity (c), and rain drop number concentration (d) in the simulation domain at 18:00 UTC for the RS2 simulation.