Supplement of Atmos. Chem. Phys., 26, 11561–11582, 2026
https://doi.org/10.5194/acp-26-11561-2026-supplement

Atmospheric Chemistry and Physics
Open Access

Supplement of

Tracking air volumes for assessing the effect of urban aerosols on convective precipitation: a multi-member modeling study

Friederike Keil et al.

Correspondence to: Friederike Keil (friederike.keil@hereon.de)

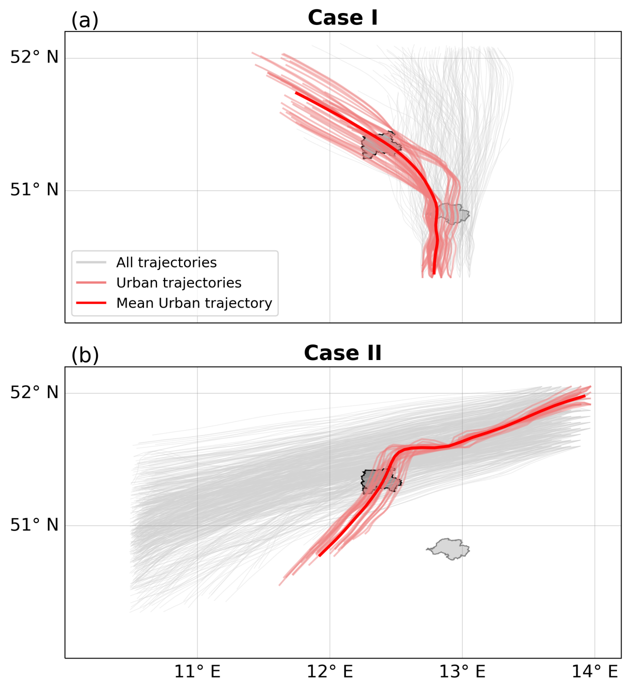

Figure S1. Trajectories for case I (a) and case II (b) showing every 5th trajectory in gray. Trajectories passing the urban area of Leipzig in light red and mean urban trajectory in red.

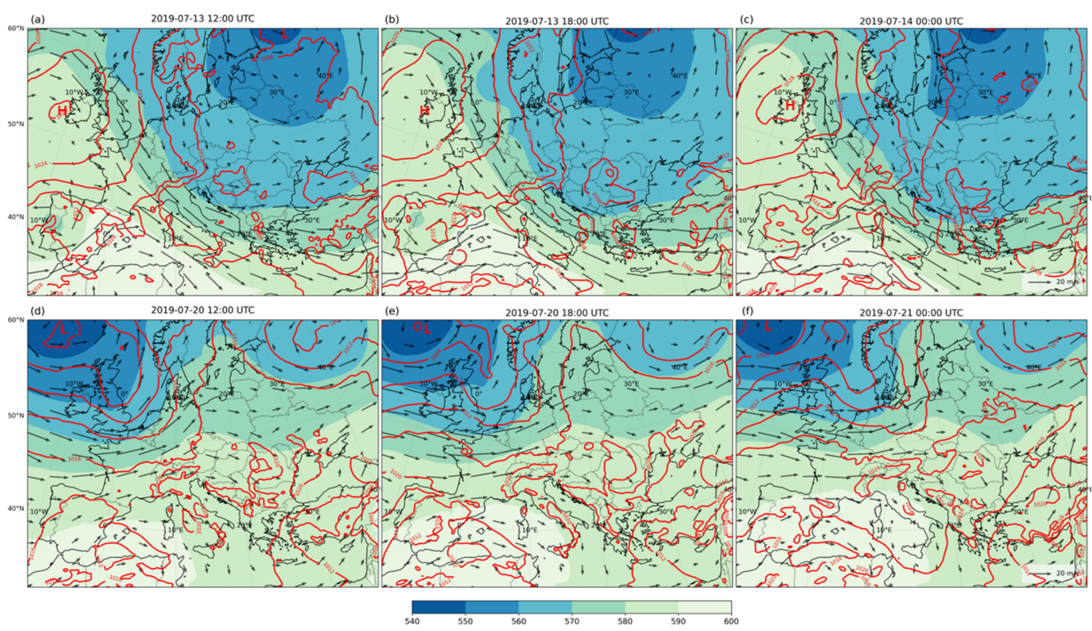

Figure S2. Synoptic scale forcing for case I (a-c) and case II (d-f). Analysis at 12:00, 18:00 and 00:00 UTC showing 500 hPa geopotential height (gpdm; shading), sea level pressure (hPa, red contours), and 500 hPa wind barbs.

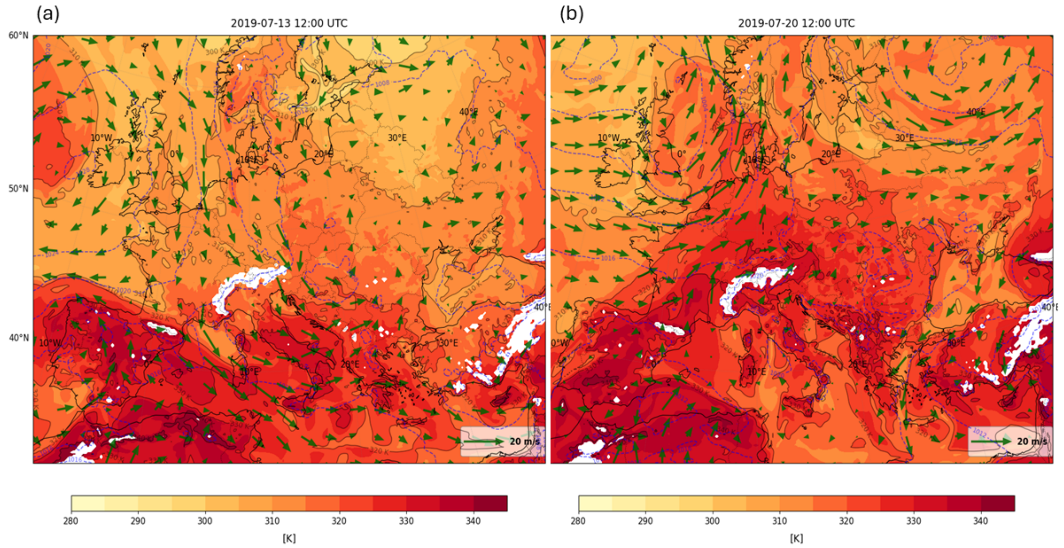

Figure S3. 12:00 UTC analysis of equivalent potential temperature at 850hPa, 850hPa wind barbs and sea level pressure (hPa, blue contours) for case I (a) and case II (b).

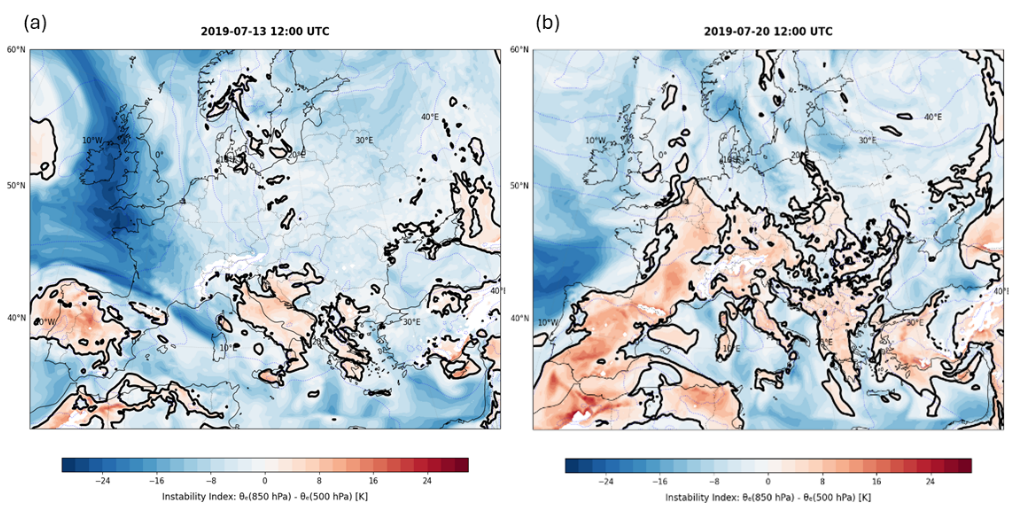

Figure S4. 12:00 UTC analysis of vertical differences in equivalent potential temperature between 850 and 500 hPa for case I (a) and case II (b).

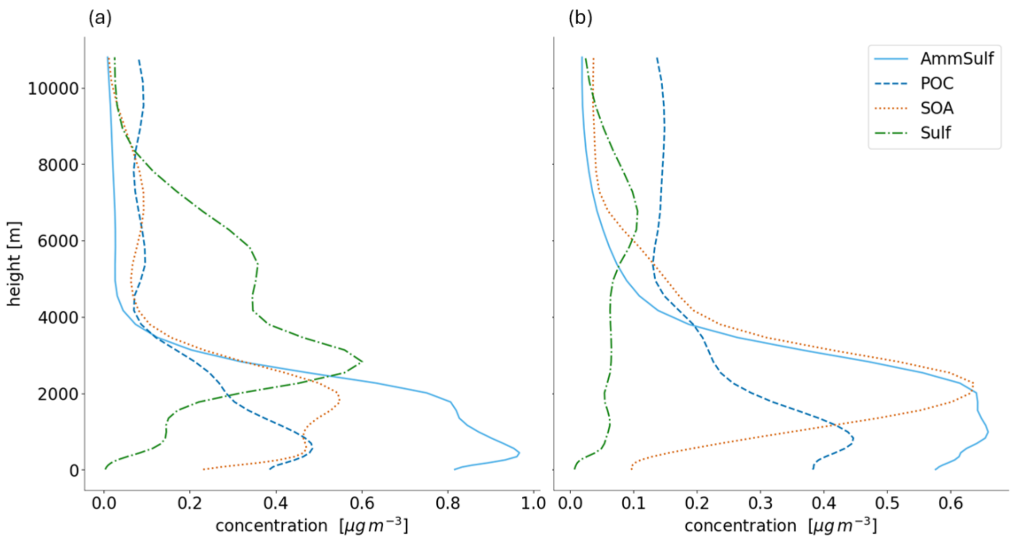

Figure S5. Spatially and temporally averaged vertical profiles of ammonium sulfate (light blue), sulfate (green), primary organic carbon (dark blue), and secondary organic aerosols (SOA; brown) for case I (a) and case II (b).

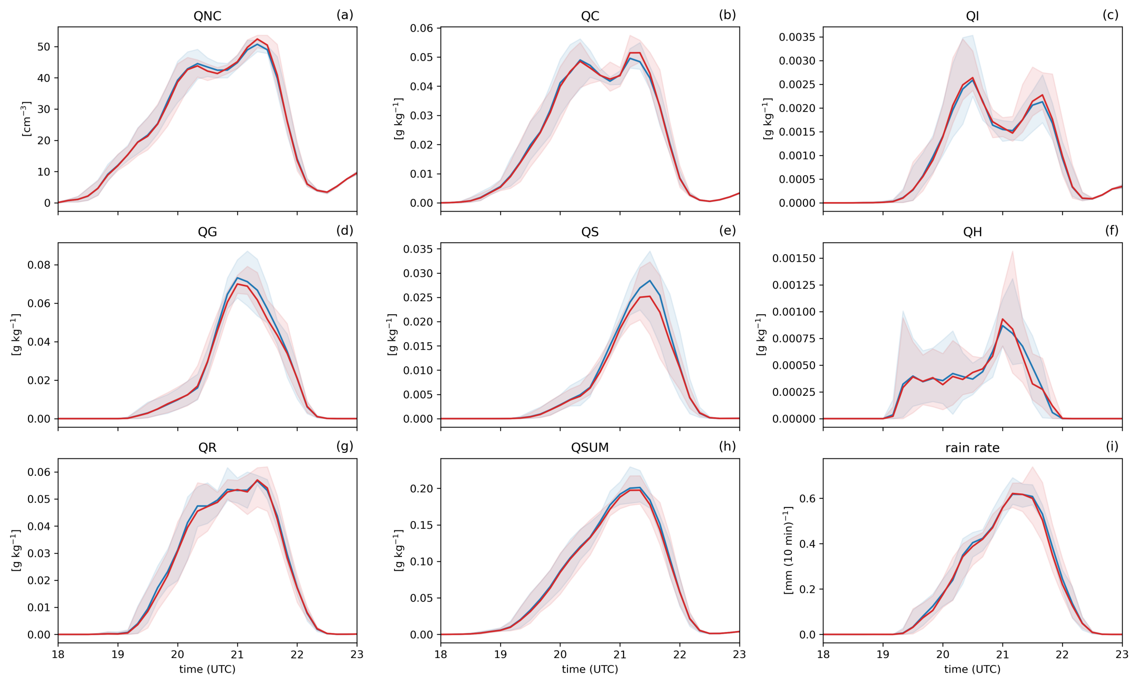

Figure S6. Horizontally averaged and layer-thickness-weighted vertical averages (0 – 13 km) time series of (a) activated cloud droplet number concentration (QNC), (b) cloud water (QC), (c) cloud ice (QI), (d) graupel (QG), (e) snow (QS), (f) hail (QH), (g) rain (QR), (h) total cloud condensate (water, ice, snow, graupel, rain, and hail; QSUM), (i) horizontally averaged rain rate for case I. Lines indicate the ensemble mean, while shading represents the ensemble minimum–maximum range. Blue lines correspond to the BASE experiment, red to the NONURBAN experiment.

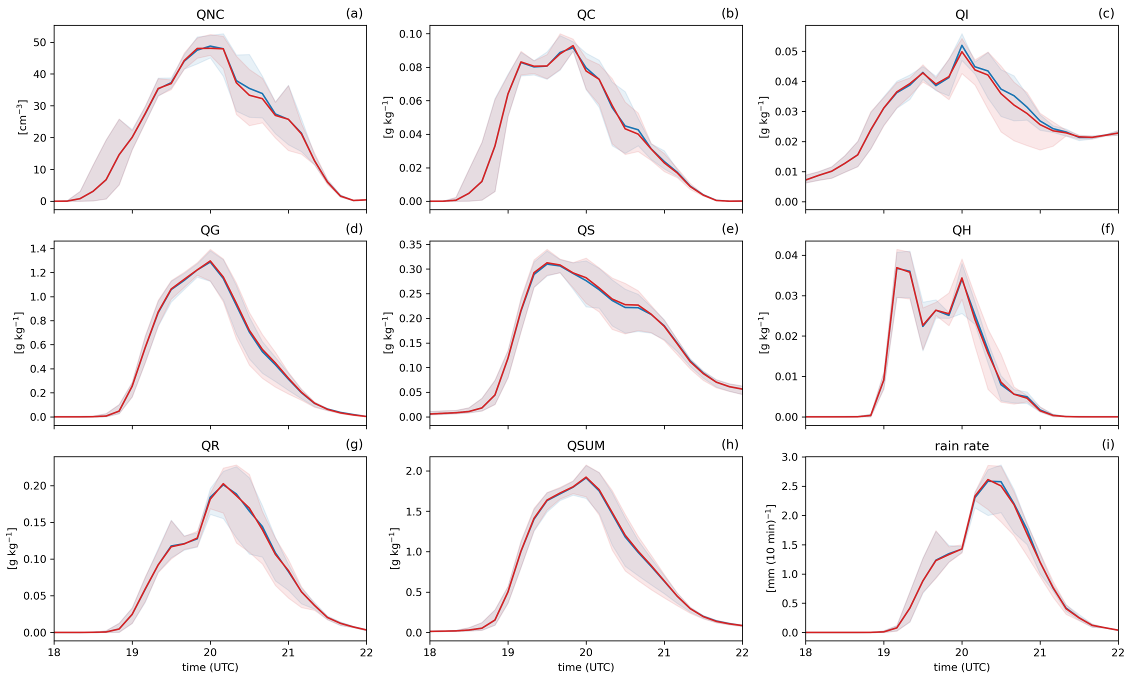

Figure S7. Horizontally averaged and layer-thickness-weighted vertical averages (0 – 13 km) time series of (a) activated cloud droplet number concentration (QNC), (b) cloud water (QC), (c) cloud ice (QI), (d) graupel (QG), (e) snow (QS), (f) hail (QH), (g) rain (QR), (h) total cloud condensate (water, ice, snow, graupel, rain, and hail; QSUM), (i) horizontally averaged rain rate for case II. Lines indicate the ensemble mean, while shading represents the ensemble minimum–maximum range. Blue lines correspond to the BASE experiment, red to the NONURBAN experiment.

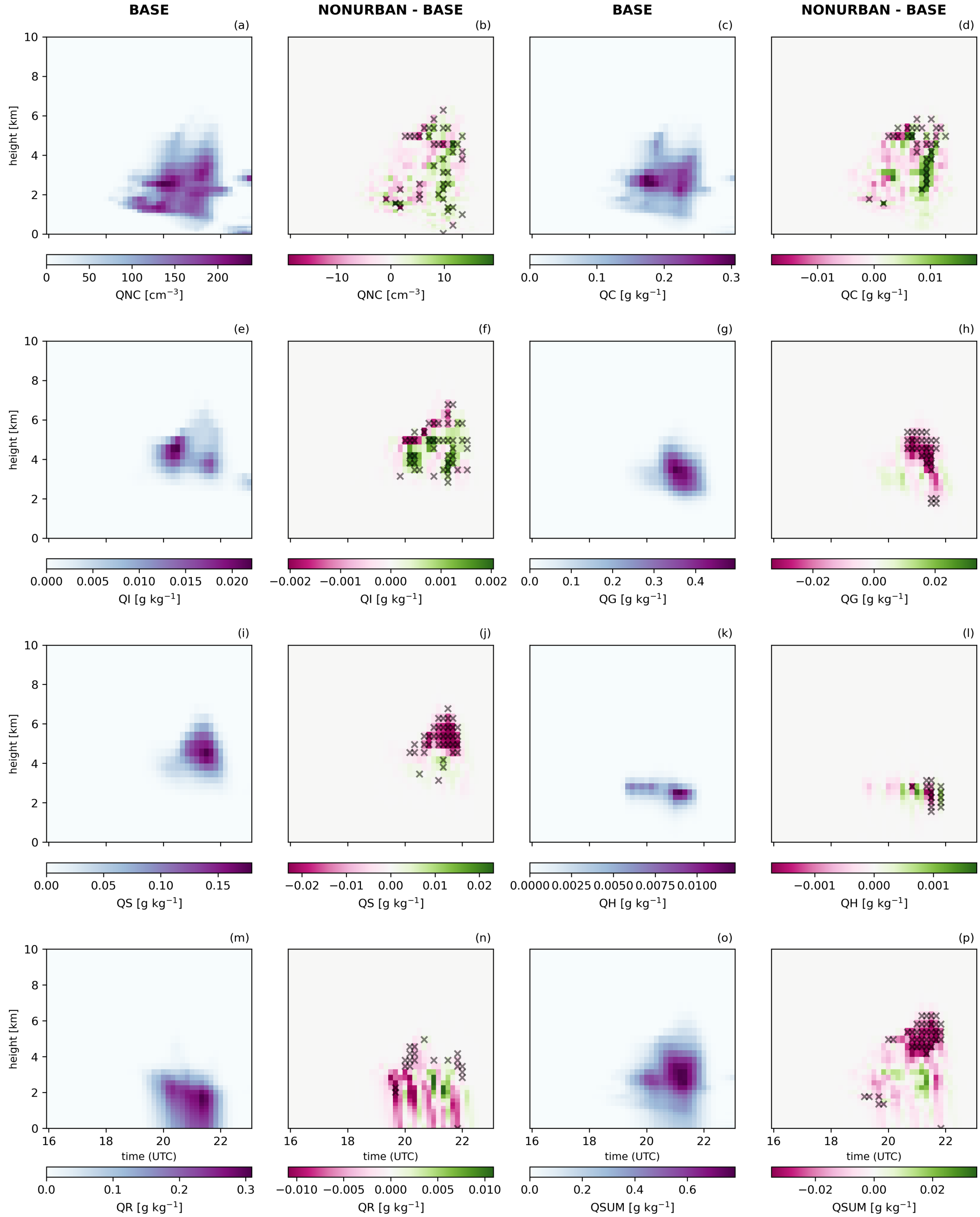

Figure S8. Horizontally averaged vertical profiles of cloud microphysical variables from the ensemble simulations for case I. The left column of each pair shows the ensemble mean of the BASE simulation, while the right column shows the difference between the NONURBAN and BASE simulations. Variables include cloud droplet number concentration (QNC), cloud water (QC), cloud ice (QI), graupel (QG), snow (QS), hail (QH), rain (QR), and the sum of all hydrometeors (QSUM). Black crosses indicate levels where the differences are statistically significant at the 90 % confidence level.

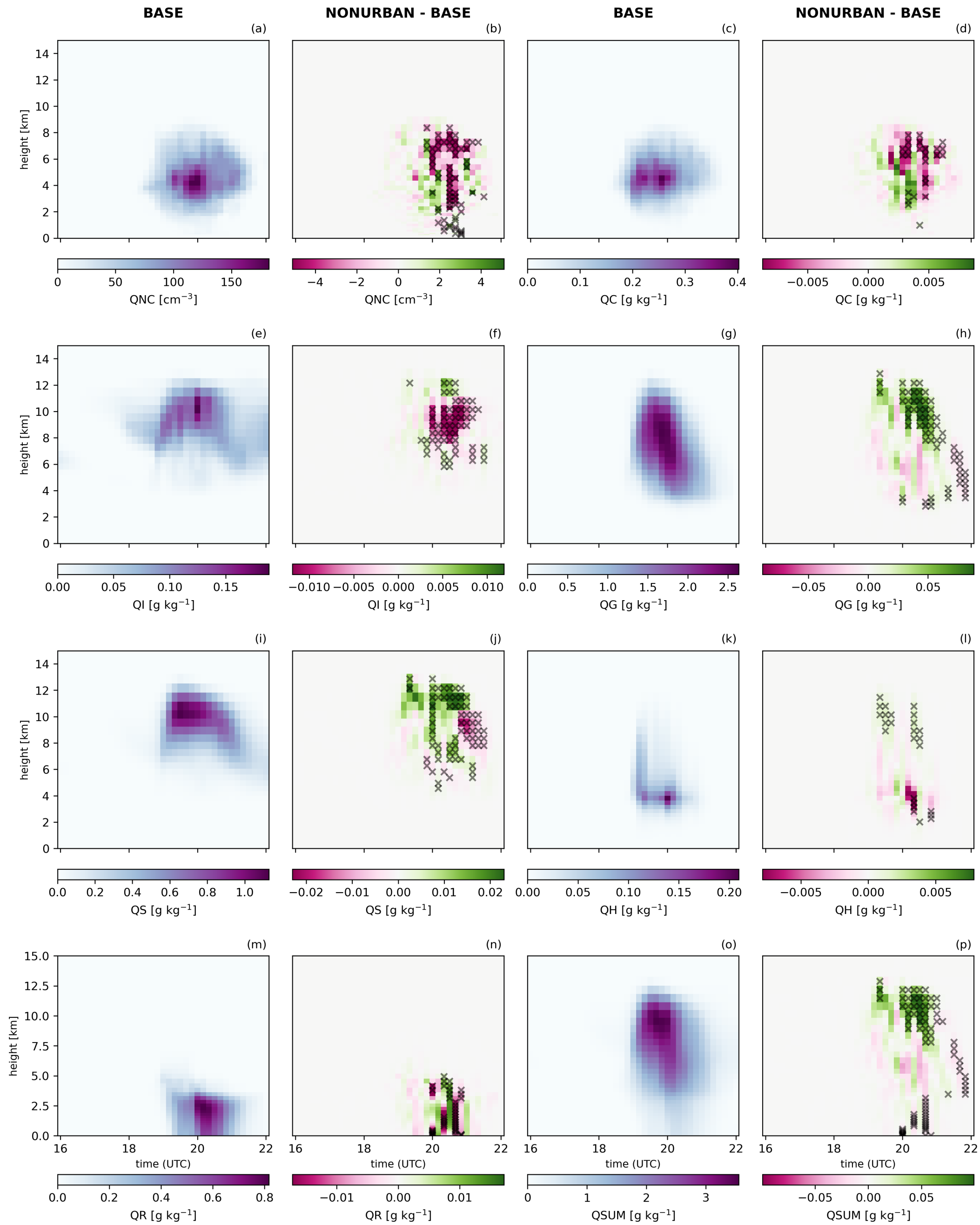

Figure S9. Horizontally averaged vertical profiles of cloud microphysical variables from the ensemble simulations for case II. The left column of each pair shows the ensemble mean of the BASE simulation, while the right column shows the difference between the NONURBAN and BASE simulations. Variables include cloud droplet number concentration (QNC), cloud water (QC), cloud ice (QI), graupel (QG), snow (QS), hail (QH), rain (QR), and the sum of all hydrometeors (QSUM). Black crosses indicate levels where the differences are statistically significant at the 90 % confidence level.