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Supplement of

The efficacy of aerosol–cloud radiative perturbations from near-surface emissions in deep open-cell stratocumuli

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1 Figures

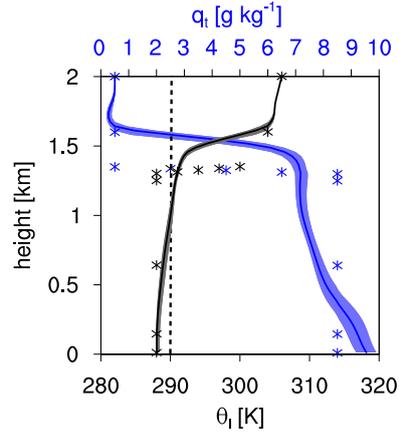


Figure S1. Simulated profiles of liquid potential temperature (θ_l , black) and total moisture content (q_t , blue) for the *ctrl* simulation. Median and interquartile range of profiles are shown for the entire simulated period (45 h). Hence, the spread captures the entire spatio-temporal variability of both entities throughout the simulation. Dashed line indicates 290 K isoline. Markers denote prescribed sounding at initialisation for θ_l (blue) and q_t (black).

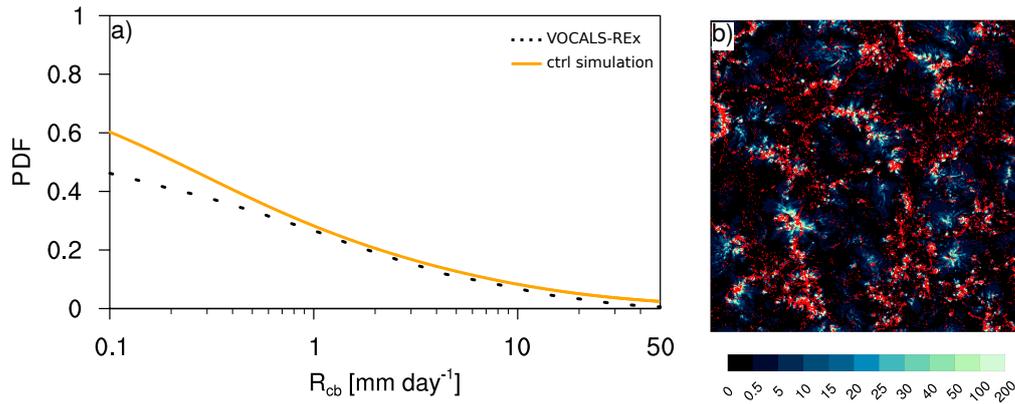


Figure S2. a) Probability distribution function (PDF) of cloud-base precipitation rate (R_{cb}) obtained during campaign (Wood *et al.* (2011) denoted in black) and for VOCALS-REx simulations *ctrl* simulation (yellow). b) Cloud-base precipitation field (R_{cb}) in contours with updraft regions (vertical velocity $> 0.5 \text{ m s}^{-1}$) overlaid in red.

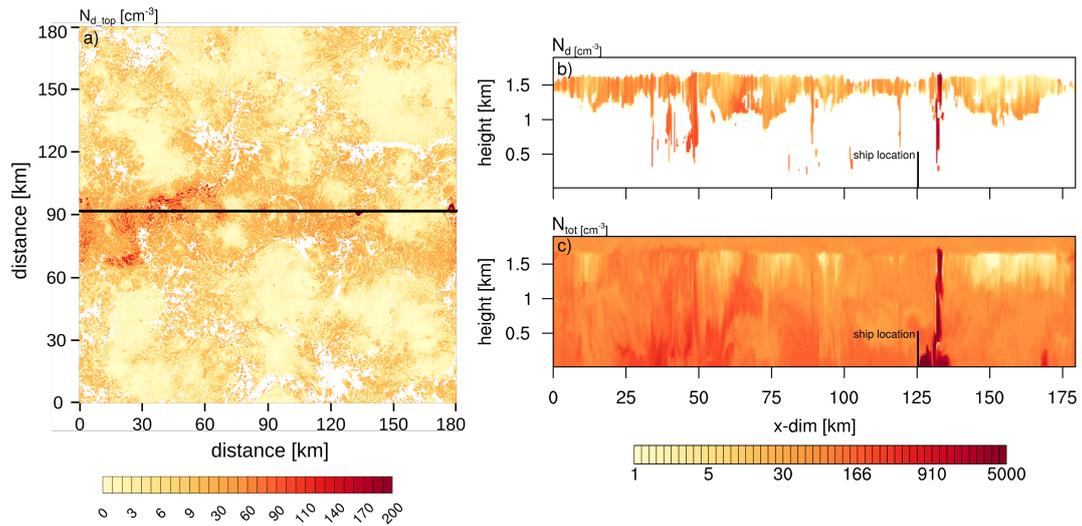


Figure S3. (a) instantaneous vertically integrated cloud droplet number concentration (N_d) for the *ship* simulation. Black line denotes location of cross-sections shown in b–c). (b) N_d and (c) total number concentration ($N_{tot} = N_a + N_d$, where N_a denotes the aerosol number concentration). Instantaneous location of ship is marked.

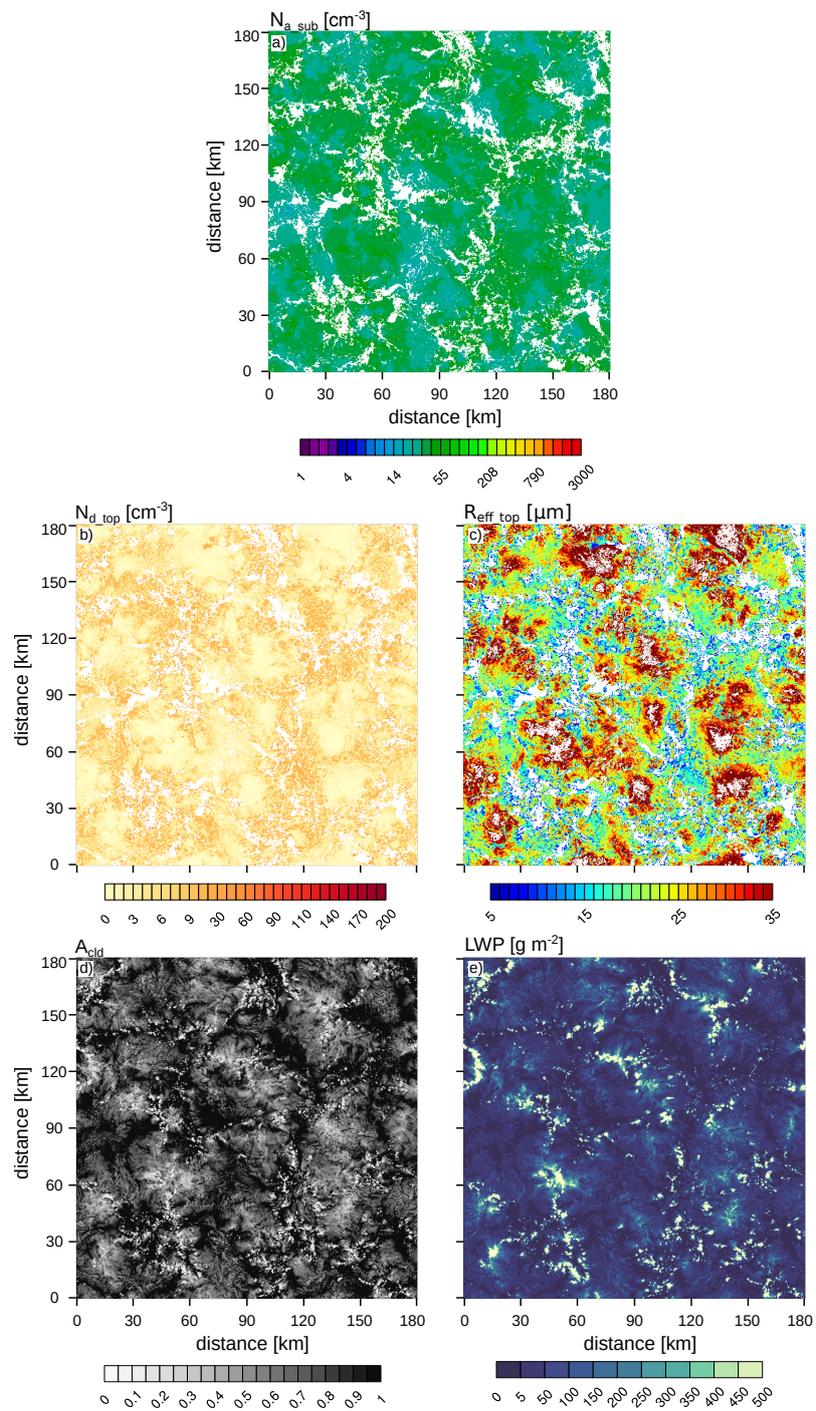


Figure S4. Same as Fig. 4 in manuscript, but for *ctrl* simulation.

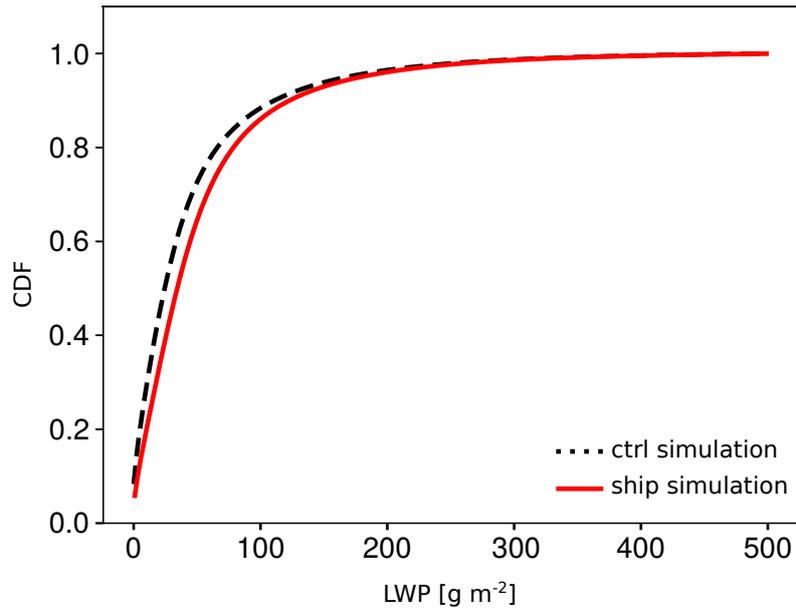


Figure S5. Cumulative distribution function (CDF) of liquid water path (LWP) for the *ctrl* and the *ship* simulation. CDF is computed over detrained cloud regions only over the last 24 h of both simulations.

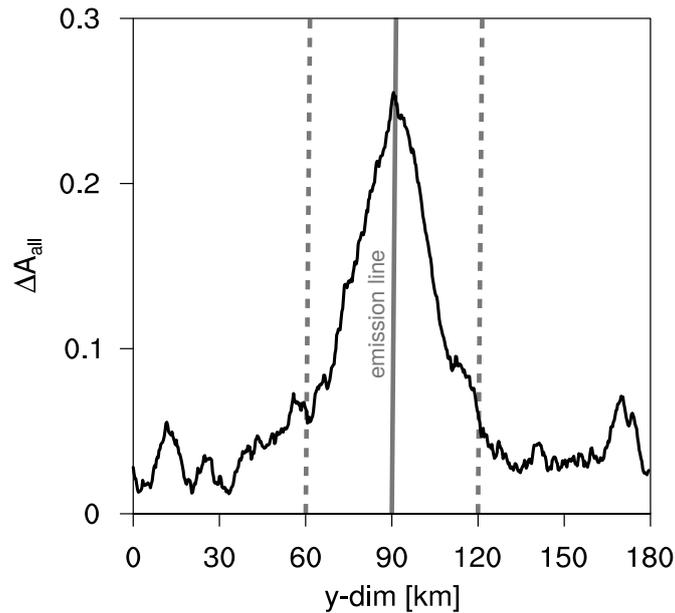


Figure S6. Across-track difference in all-sky albedo (A_{all}) between the *ship* and *ctrl* simulation averaged over the last 24 h of both simulations. Solid grey line denotes the location of the emission line of the ship, while grey dashed lines mark the seeded domain (± 30 km from emission line).

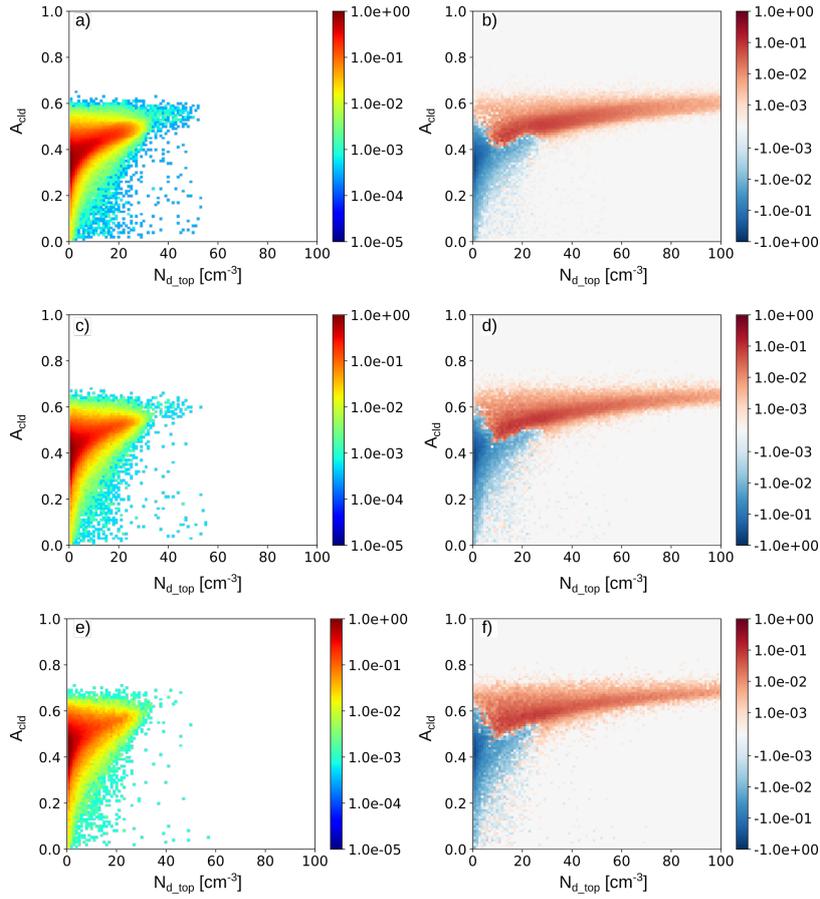


Figure S7. Occurrence rate F [%] for the cloud-top droplet number concentration (N_{d_top}) versus cloud albedo (A_{cld}) phase space. The N_{d_top} - A_{cld} space was sub-filtered for LWP within the ranges of $60\text{--}80\text{ g m}^{-2}$ (top row), $80\text{--}100\text{ g m}^{-2}$ (middle row), and $100\text{--}120\text{ g m}^{-2}$ (bottom row). Results are shown in a,c,e) for the last 24 h of the *ctrl* simulation and absolute changes in F for the *ship* simulation with respect to the *ctrl* simulation are shown in b,d,f). The bin widths for each of which F is defined are $\Delta N_{d_top} : 1\text{ cm}^{-3}$, and $\Delta A_{cld} : 0.01$.

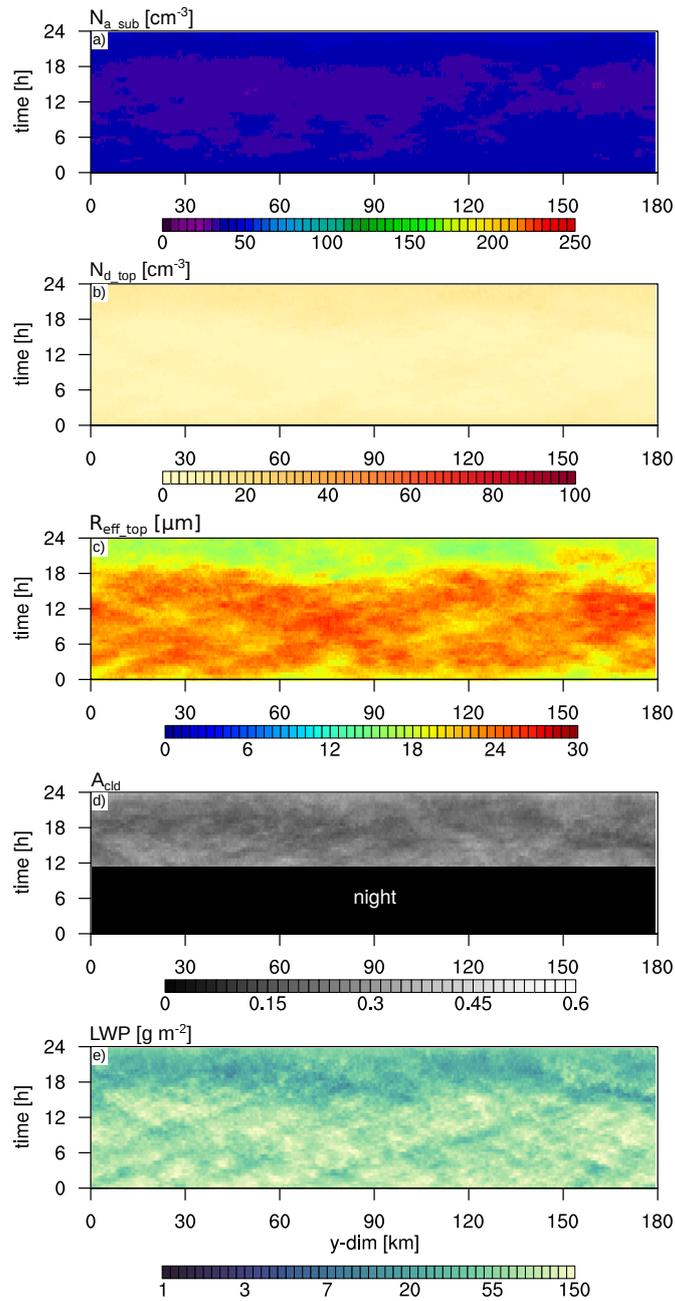


Figure S8. Same fields are shown as in Fig. 6 of manuscript, but for the *clean* simulation.