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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 ($\theta_l$, 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 $\theta_l$ (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 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 ($A_{\text{all}}$) 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 ($N_{d,\text{top}}$) versus cloud albedo ($A_{cld}$) phase space. The $N_{d,\text{top}}$-$A_{cld}$ space was sub-filtered for LWP within the ranges of 60–80 g m$^{-2}$ (top row), 80–100 g m$^{-2}$ (middle row), and 100–120 g m$^{-2}$ (bottom row). Results are shown in a,c,e) for the last 24 h of the $ctrl$ simulation and 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 $\Delta N_{d,\text{top}} : 1 \text{ cm}^{-3}$, and $\Delta A_{cld} : 0.01$. 
Figure S8. Same fields are shown as in Fig. 6 of manuscript, but for the clean simulation.