Supporting Material: The efficacy of aerosol-cloud-radiative perturbations in deep open- and closed-cell stratocumulus

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1 Figures

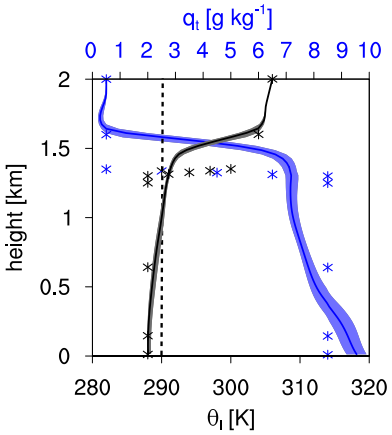

Figure 1. Simulated profiles of liquid potential temperature (θ_l, black) and total moisture content (q_t, blue) for the *ctrl* simulation. Median and interquartile range of profiles are shown for the entire simulated period (45 h). Hence, the spread captures the entire spatio-temporal variability of 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).

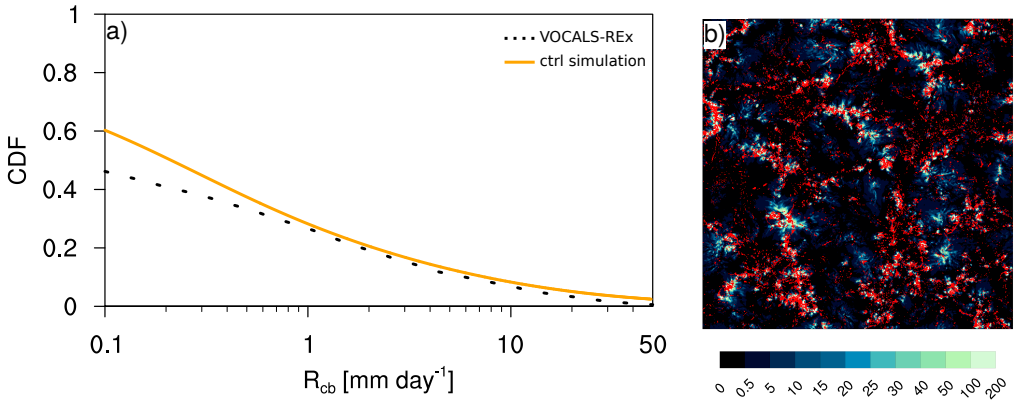

Figure 2. a) Cumulative distribution function (CDF) of cloud-base precipitation rate (R_{cb}) obtained during campaign *(Wood et al. (2011)* denoted in black) and for VOCALS-REx simulations *ctrl* simulation (yellow). b) Cloud-base precipitation field (R_{cb}) in contours with updraft regions (vertical velocity$> 0.5\,\mathrm{m\,s^{-1}}$) overlaid in red.

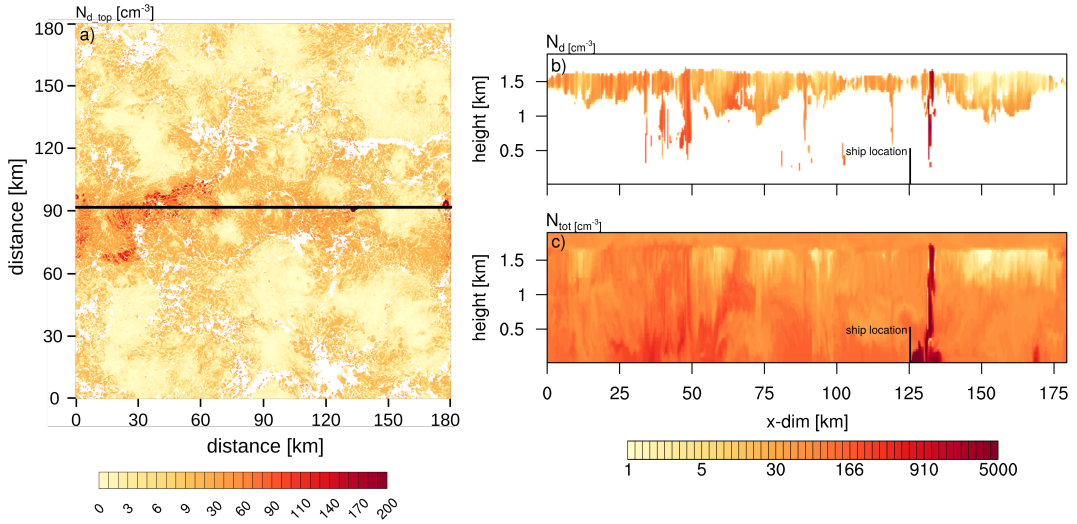

Figure 3. (a) instantaneous vertically integrated cloud droplet number concentration (N_d) for ship_open. Black line denotes location of cross-sections shown in b – c). (b) N_d and (c) total number concentration ($N_{tot} = N_a + N_d$, where N_a denotes the aerosol number concentration). Instantaneous location of ship is marked.

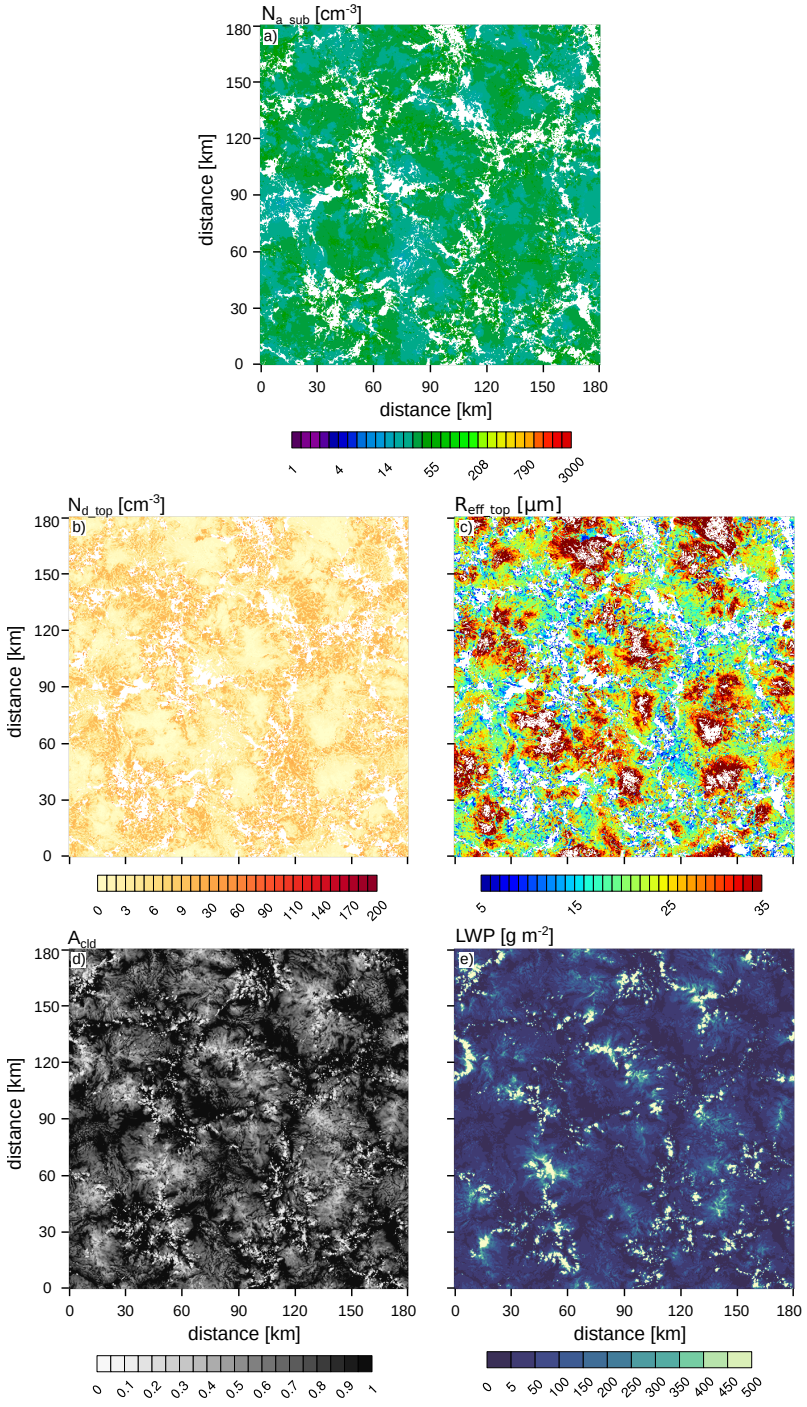

Figure 4. Same as Fig. 4 in manuscript, but for *ctrl* simulation.

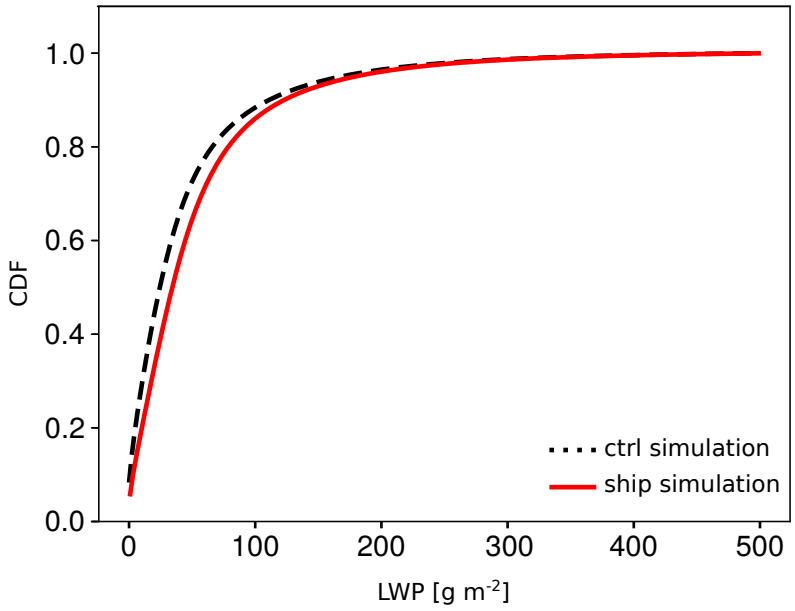

Figure 5. Cumulative distribution function (CDF) of liquid water path (LWP) for the *ctrl* and the *ship* simulation. CDF is computed over detrained cloud regions only over the last 24 h of both simulations.

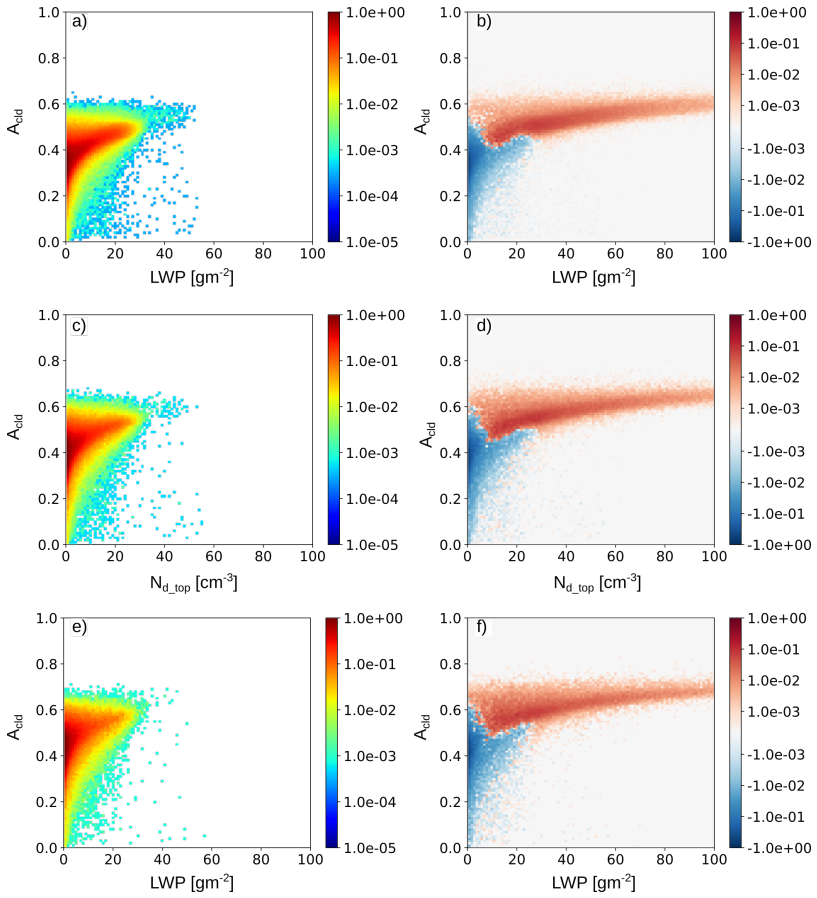

Figure 6. Occurrence rate F [%] for the cloud-top droplet number concentration (N_{d_top}) versus cloud albedo (A_{cld}) phase space. The N_{d_top}-A_{cld} space was sub-filtered for LWP within the ranges of $60-80\,\mathrm{g\,m^{-2}}$ (top row), $80-100\,\mathrm{g\,m^{-2}}$ (middle row), and $100-120\,\mathrm{g\,m^{-2}}$ (bottom row). Results are shown in a,c,e) and 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 ΔN_{d_top} : 1 $\mathrm{cm^{-3}}$, and ΔA_{cld} : 0.01.

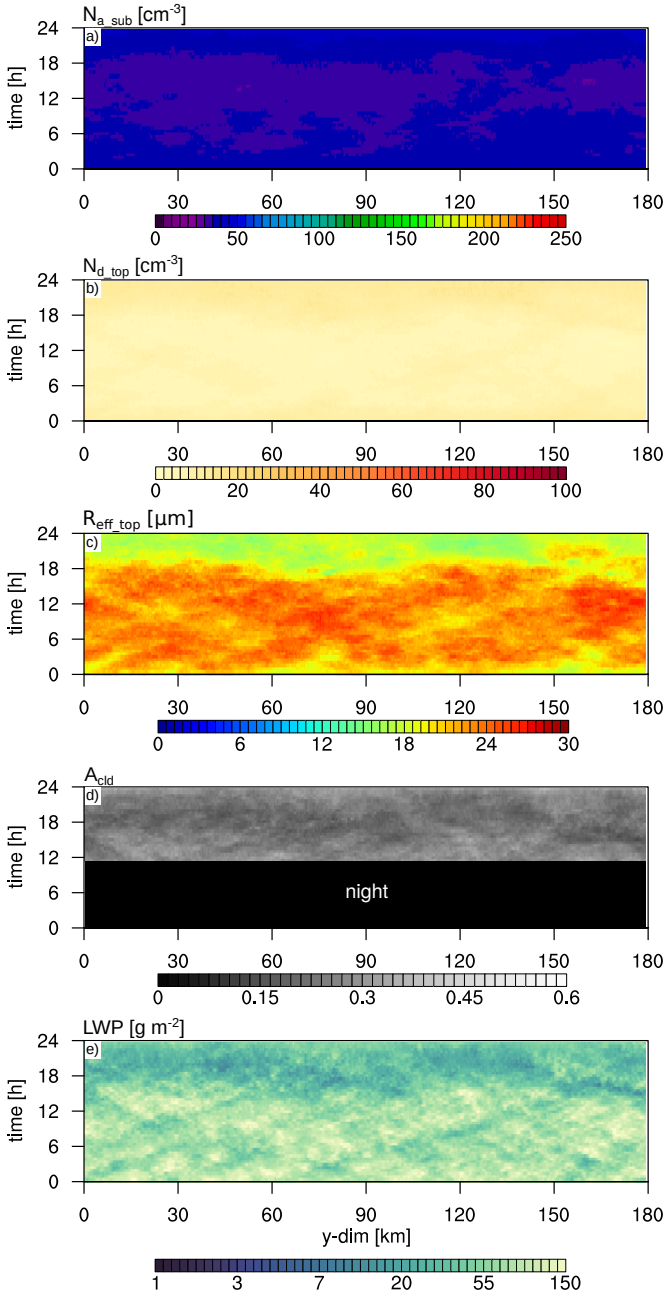

Figure 7. Same fields are shown as in Fig. 6 of manuscript, but for the *clean* simulation.