Supporting Information for "What favors convective aggregation, and why?"

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1. Supplementary Figures 1 to 4

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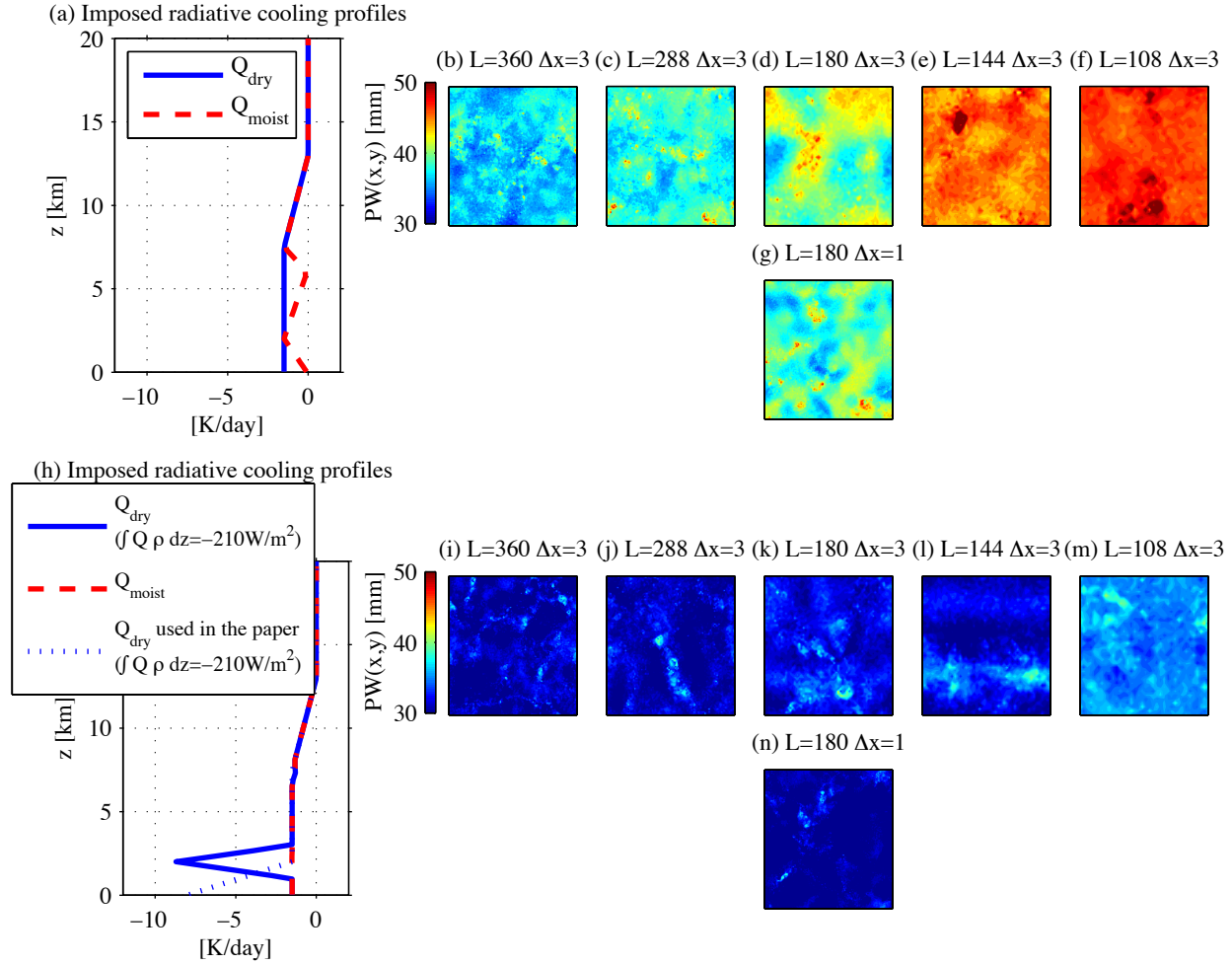
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Figure 1.   SUPPLEMENTARY FIGURE 1: Same as Figure 1 in the paper, namely radiative profiles in (a) and (h), and precipitable water PW (mm) in (b-g) and (i-n) at various domain sizes L and resolutions Δx (in km). In each simulation, the radiative cooling profile is imposed, and two contrasting profiles are used in dry and moist regions (blue and red profiles respectively in the left panels). The simulation shown in panels (a-g) includes the effect of clouds in the moist region (red curve in a). The simulation shown in panels (h-n) includes the low-level cooling in the dry region of Figure 1h but applied at $z = 2$ km instead of the surface (keeping the net integrated cooling equal, solid blue curve in h).
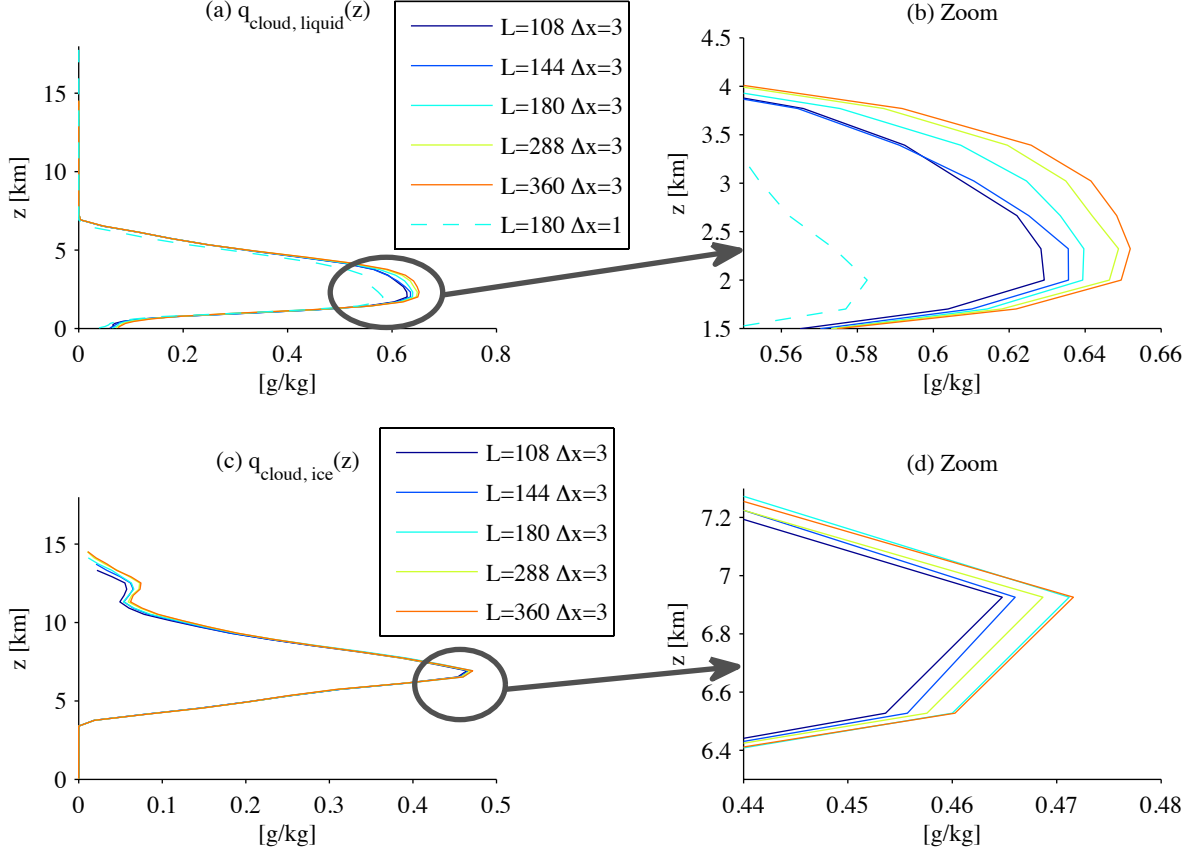
Figure 2. SUPPLEMENTARY FIGURE 2: Vertical profiles of condensate amounts in clouds (in g kg^{-1}) for various domain sizes and resolutions. Panel (a) shows the liquid cloud water amount, and panel (b) is a zoom near its maximum. Panel (c) shows the ice cloud water amount, and panel (d) is a zoom near its maximum. To avoid complications associated with self-aggregation, which can be both a cause or a consequence of cloud water variability, these are simulations with horizontally-homogeneous radiative cooling rates (-1.5 K day^{-1} in the troposphere everywhere in the domain, decreasing to zero in the stratosphere). The condensate amount in clouds is larger at coarser resolution, as well as on larger domains.
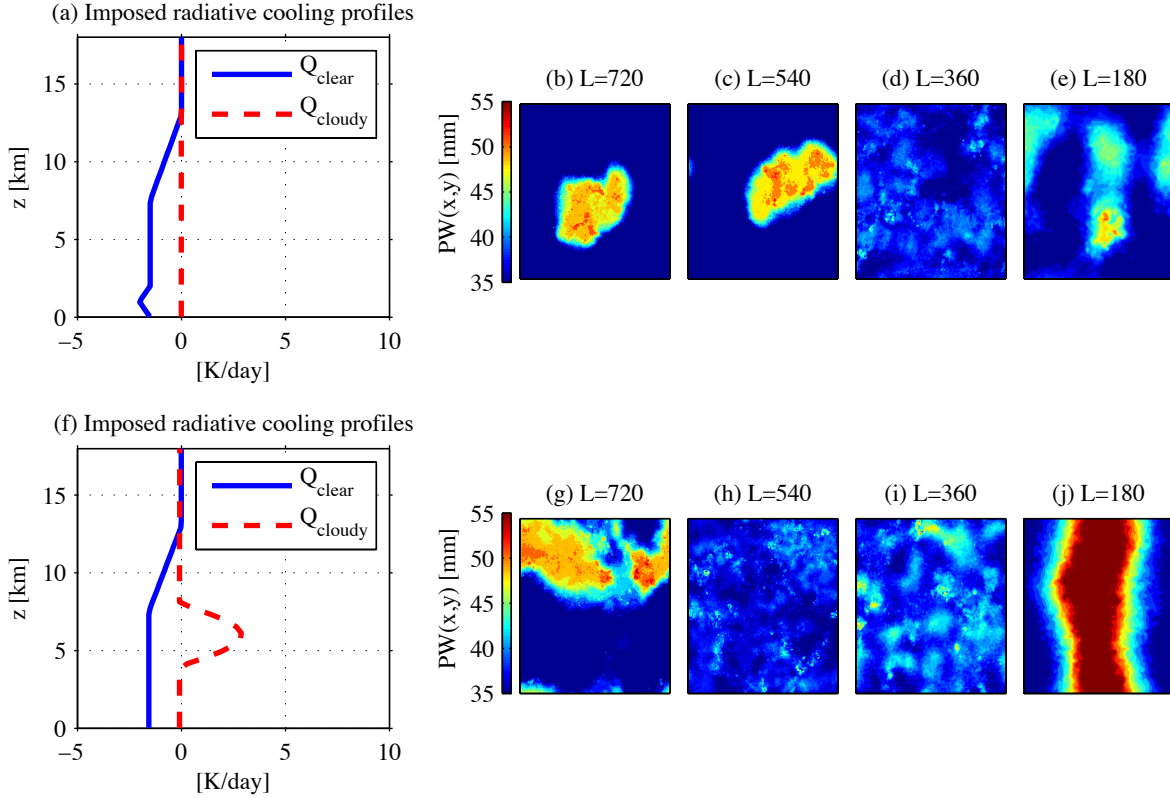
Figure 3.   SUPPLEMENTARY FIGURE 3: Same as Figure 3 in the paper, but the low-level cooling in the dry region and the mid-level warming in the moist region are applied separately. Applying them separately does not yield aggregation at all domain sizes.
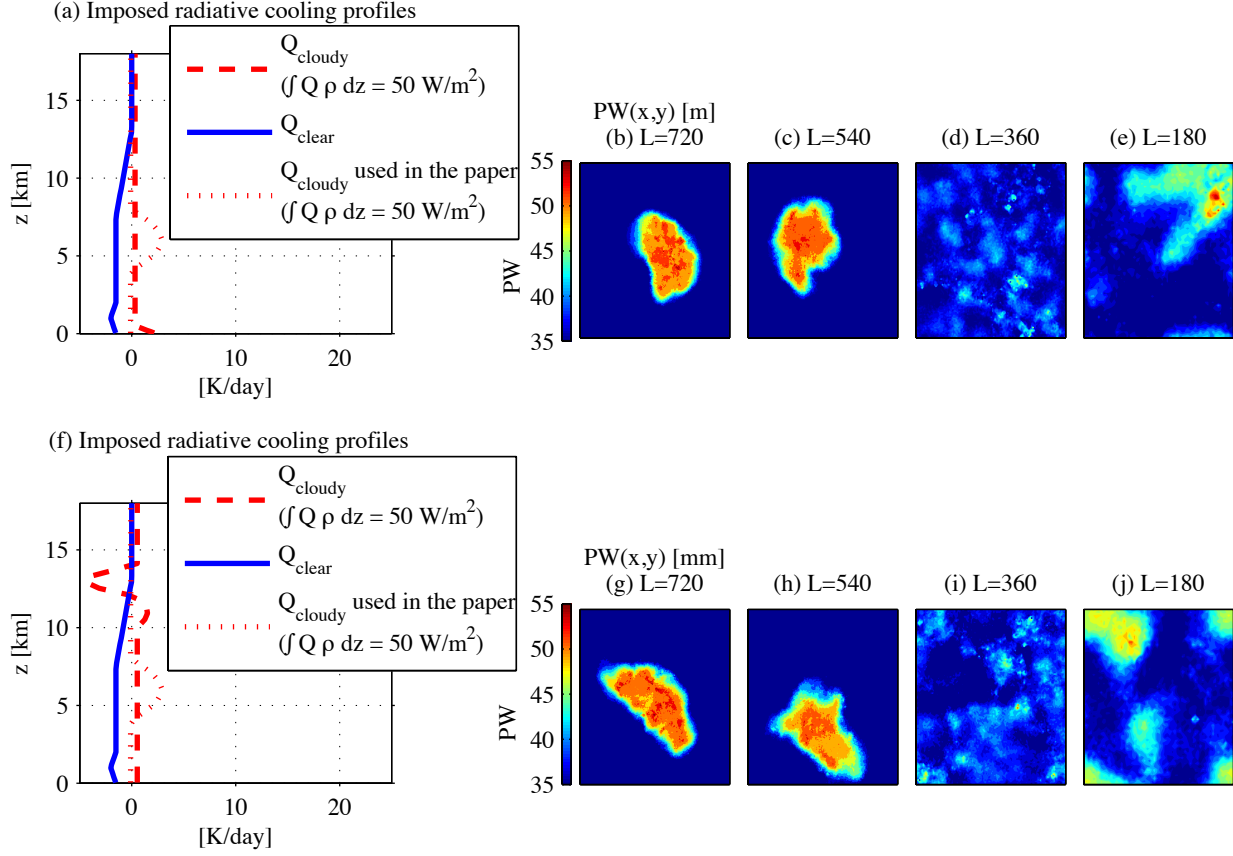
Figure 4. SUPPLEMENTARY FIGURE 4: Same as Figure 3 in the paper, but instead of applying the mid-level part of the radiation profile in cloudy regions, we apply the low-level (top panels) and the high-level (bottom panels) parts. To ease comparison, the profiles are shifted (constant added) to yield the same net vertically-integrated radiative cooling. Neither the low cloudy part nor the high cloudy part yields aggregation at all domain sizes.