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The role of cold pools and microphysics schemes in the organization of convection

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It has been suggested that larger coldpool radii can delay the onset of convective self-aggregation. We demonstrate that coldpool characteristics can differ between 5 of the commonly microphysical schemes used by the WRF-model. We systematically increase/decrease coldpool size by changing the evaporation of rain to observe the impact on organization. One complication in interpreting these results is that a change in the evaporation of rain also produces a change in net convective heating which could impact organization. To isolate this effect, a set of experiments is performed by increasing (decreasing) the horizontal wind speed used in the surface flux calculation for all grid points within coldpool interiors to produce a faster (slower) recovery and impact their radii. The ensemble experiments demonstrate how the coldpool size impacts the strength and even the sign of the surface latent heat contribution to aggregation. Nonetheless, the strong forcing of aggregation by radiation-feedbacks mean that the coldpool changes do not produce large modifications to the aggregation onset time. Thus the aggregation onset may be more impacted by the microphysical processes that determine the anvil size and low-level cloud cover, and thus ultimately the cloud-radiative forcing. This is under investigation in ongoing experiments that modify the ice fall speed and the autoconversion of cloud water to rain.

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