National Aeronautics and Space Administration
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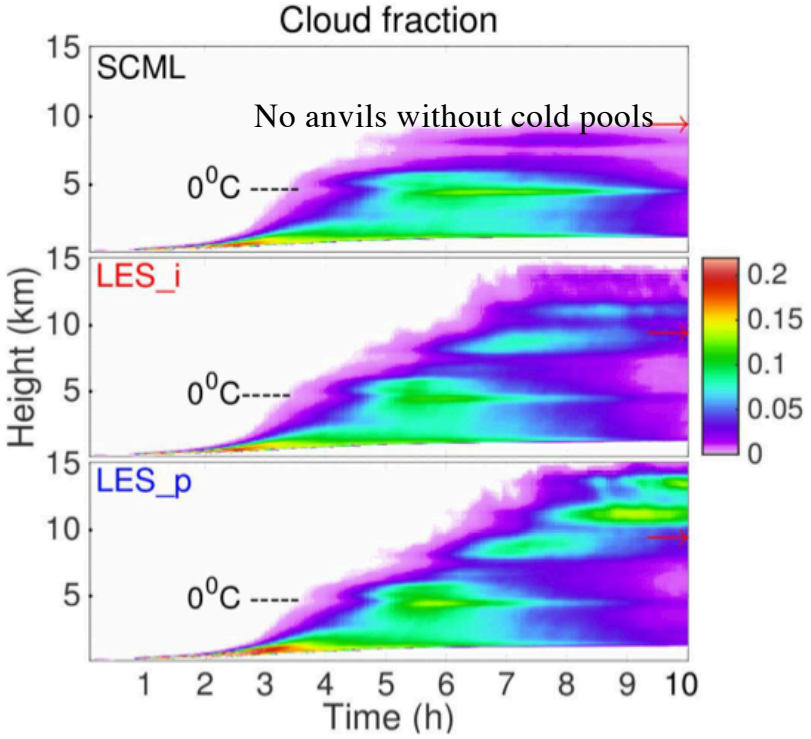
Shallow-to-deep transition of continental moist convection: cold pools, surface fluxes, and mesoscale organization



Temporal evolution of cloud fraction for the continental shallow-to-deep convection transition: without cold pools (SCML), with cold pools and interactive surface fluxes (LES_i) and with cold pools and prescribed surface fluxes (LES_p).

Problem: Quantifying the impact of cold pools on the development of moist deep convection has long been a challenge due to the lack of a reference solution void of their mechanical effects

Finding: We apply a numerical method that removes sub-domain variability of the buoyancy pertur-bations originating from rain evaporation while preserving its main thermodynamic effects, which disables the mechanical impact of cold pools.

Significance: The new approach allows to separate and quantify the role of cold pools on various features of the boundary layer. The study shows that without cold pools moist deep convection behaves similarly to the buoyancy-driven dry convection. The proposed approach can support the development of deep convection parameterizations.

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