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Self-Aggregation from Cold Pool Interaction and Global Energy Constraints

Wednesday, 5 May 2021 16:00 (1h 45m)

Typical explanations for convective self-aggregation invoke radiative convective equilibrium and free tropospheric feedbacks of circulation and radiation, caused by horizontal moisture inhomogeneities. We here show, that these feedbacks would not be needed when considering that cold pools interact. Building a simple model for this interaction, where the probability for new convective cells is increased where cells already exist, self-aggregation can be achieved. We map out the phase diagram in terms of the interaction strength between cold pool gust fronts, and find that continuous phase transitions exist, between regions without self-aggregation (homogeneous phases) and regions with self-aggregation (segregated phases). The model shown may be observationally testable and suggests, that boundary layer feedbacks alone can be sufficient in bringing about stable, system-scale clustering as is found in convective self-aggregation.

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