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Treating Deep Convective Updrafts in the Tropical Atlantic like Interacting Particles?

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Understanding the spatial correlations and interactions between tropical clouds remains a challenge for climate research. Here, we develop and apply an analysis that treats deep convective updrafts in the Tropical Atlantic like interacting particles. We discuss how far we can reproduce our findings with simplified equilibrium statistics and which possible routes towards open, non-equilibrium systems might be taken. Our analysis is based on data from large-domain, storm-resolving ICON simulations from which updraft cells were derived via object-based techniques. After the introduction of an extended pair-correlation method, we compare simulated updraft pair numbers as a function of pair distance to a random, but heterogeneous reference. We find that the average probability is enhanced to find an updraft pair within 100 km. Additionally, the spatial arrangement of larger or stronger cells deviates more from randomness compared to smaller or weaker cells, which might be related to their stronger dynamical interaction mechanisms.

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