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Large-scale order in turbulent convection and the clustering of plumes

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Turbulent convection in a fluid layer heated from below is characterized by the presence of an ensemble of coherent convective plumes whose individual lifetimes are several dynamical times and which have horizontal dimension comparable with the boundary layer thickness. We numerically show that rising and sinking plumes cluster into aggregates whose typical scale grows with time. We show that this behavior is encountered for different values of the Rayleigh number, and for different values of the aspect ratio of the simulation domain. Some of the possible mechanisms that are responsible for the clustering of plumes are discussed.