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Properties and transitions of mesoscale convective organisation during EUREC4A using unsupervised learning

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The representation of shallow tradewind cumulus clouds in climate models accounts for the majority of inter-model spread in climate projections,
highlighting an urgent need to understand these clouds better. In particular, their spatial organisation appears to cause a strong impact of their radiative properties and dynamical evolution. The precise mechanisms driving different forms of convective organisation which arise both in nature and in simulations are, however, currently unknown.

Using unsupervised learning for identifying regimes of convective organisation in the tropical Atlantic, we will show results from analysing: a) what the
radiative properties of different forms of organisation are, b) what atmospheric characteristics coincide with different forms of organisation and c) what transitions occur when following air-masses along Lagrangian trajectories. Specifically, we find: a) net radiation changes significantly between different forms of organisation, b) agreement with previous studies on the importance of boundary layer wind-speed and to some degree atmospheric stability, and c) we are able to succinctly capture what transitions occur between regimes.