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Convective aggregation in idealised models and realistic equatorial cases

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Idealised explicit convection simulations of the Met Office Unified Model are shown to exhibit spontaneous self-aggregation in radiative-convective equilibrium, as seen previously in other models in several recent studies. This self-aggregation is linked to feedbacks between radiation, surface fluxes, and convection, and the organization is intimately related to the evolution of the column water vapour (CWV) field. To investigate the relevance of this behaviour to the real world, these idealized simulations are compared with five 15-day cases of real organized convection in the tropics, including multiple simulations of each case testing sensitivities of the convective organization and mean states to interactive radiation, interactive surface fluxes, and evaporation of rain. Despite similar large-scale forcing via lateral boundary conditions, systematic differences in mean CWV, CWV distribution shape, and the length scale of CWV features are found between the different sensitivity runs, showing that there are at least some similarities in sensitivities to these feedbacks in both idealized and realistic simulations.