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On the relationship between precipitation and the spatial structure of trade wind convection

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Trade wind convection organises into a rich spectrum of spatial patterns, often in conjunction with precipitation development. This raises the question of the role of precipitation for spatial organization and vice versa. Using rain radar measurements during the EUREC^{4}A field campaign we find that precipitation rates vary mainly independently from the spatial arrangement of precipitating cells. Mean precipitation increases with the size or number of cells, as it is closely related to the precipitating area. The cells' degree of clustering, contrary, is typically greatest where the mean cell size is large and the cell number small. Consequently, scenes with a quite different spatial structure – with larger, more clustered convective structures at one time or with more numerous and distributed convective structures at another time – can have similar precipitation rates. Could spatial organization be a process to maintain precipitation rates in very different environments? We exploit large-domain realistic large eddy simulations to investigate scenes of trade wind convection that exhibit similar precipitation rates but different spatial structures. We discuss how the environment and circulation differ in these scenes and how this might necessitate different spatial structures to rain.