

Cloud-radiation interactions in RCEMIP runs of convective self-aggregation

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Cloud-radiation interactions play an important role in convective self-aggregation in idealised simulations of radiative-convective equilibrium and in real-world organised convection. This work aims to explore the radiative feedbacks of different cloud types to enable a deeper understanding of which cloud types play key roles in aggregation. We use three domain setups of the Met Office's Unified Model, the first two of which follow the RCEMIP protocol: a large domain (6048 x 432 km, 3 km horizontal grid spacing), a small domain (100 x 100 km, 1 km grid spacing) and another small domain with a 0.1 km grid spacing. Each domain has been run with three fixed sea surface temperatures (SSTs) of 295, 300 and 305 K. Preliminary results suggest that the key direct radiative interactions that drive aggregation are longwave interactions with anvil clouds and both longwave and shortwave interactions with water vapour (including clear-sky regions). However, the extent of these interactions are all functions of domain size, resolution, SST and level of aggregation. From these results, we can gain insight into which cloud types need to be represented well in models for aggregation/organisation to develop more realistically.

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