Contribution ID: **10** Type: **Poster**

The impact of land-sea contrasts in the aggregation of convection

Tuesday 17 May 2022 12:23 (2 minutes)

Studies on the self-aggregation of convection have identified key physical mechanisms which drive and then maintain aggregation in a range of idealised radiative-convection equilibrium (RCE) models. These models are typically run without any land, rotation, variation in sea-surface temperatures (SSTs), or a diurnal cycle. Therefore, a key recurring question is how these convective processes and mechanisms manifest in the real world. Several studies have tried to tackle this question by increasing the complexity of processes in the models, such as SST gradients, adding a slab ocean, adding a diurnal cycle, or adding an aerosol diabatic heating perturbation. Particularly, the inclusion of interactive ocean surfaces has been shown to impact the formation of aggregated clusters.

The interactions between land surfaces and aggregation are less well understood. Early studies have found that convective aggregation may favour land areas over oceans, and that soil moisture feedbacks can oppose the aggregation altogether. In this study we investigate the relationship between land, oceans, and aggregation, addressing the following questions:
1. How does the inclusion of an idealised island into a global RCE model impact the aggregation of convection and its mechanisms?
2. How sensitive are these results to our choice of land parameters?

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Session Classification: Poster pitches