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Using multiple equilibria in precipitation to understand self-aggregation of deep tropical convection in a warming climate[1] SHARON SESSIONS, STIPO SENTIC, DAVID RAYMOND, New Mexico Institute of Mining and Technology — Understanding mechanisms of convective organization is currently an important problem in tropical meteorology. Recent numerical simulations show that the tendency for deep tropical convection to self-aggregate increases as sea surface temperatures (SSTs) increase. This has significant implications for hurricane genesis in a warming climate. Investigating the conditions over which convection self-aggregates requires large domains and is therefore computationally expensive. An alternative approach utilizes the analogy between multiple equilibria in limited domain simulations, and the dry and precipitating regions in a large domain with self-aggregated convection. Multiple equilibria refers to a steady state which either exhibits a completely dry troposphere or persistent precipitating deep convection under identical forcing conditions. The large scale circulation is parameterized based on the assumption that horizontal gradients in temperature are small in the tropics. Understanding the mechanisms which permit multiple equilibria on small domains is a computationally economic approach to understanding self-aggregation. We show how multiple equilibria depend on SSTs, and thus provide insight to self-aggregation in a warming climate.

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Sharon Sessions
New Mexico Institute of Mining and Technology

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