



Studying Tropical Convective Organization Using the Weak Temperature Gradient Approximation

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Tropical convective organization is the process in which disorganized convection organizes into regions of intense convective activity surrounded by dry, convectively inactive regions. Well known examples are tropical cyclones and the Madden-Julian Oscillation (MJO)—they affect atmospheric energetics, and the MJO affects virtually all weather on our planet. Recent advances in idealized modelling of tropical convection, namely the weak temperature gradient (WTG) approximation, enable us to study convective organization in idealized settings. The WTG approximation parameterizes the effects of the large-scale on local convection, and can be used in idealized sensitivity studies of convection to changes in large-scale convective environment. To model organized convection in the context of the MJO, we used observations from the Dynamics of the Madden-Julian Oscillation (DYNAMO) field campaign to force WTG simulations in a cloud resolving model, and test how well the WTG approximation reproduces variations in convective diagnostics: precipitation rate, stability, moisture content, and large-scale transport (gross moist stability). We find that the WTG approximation reproduces variations in these diagnostics, and relationships between them. The ability of WTG approximation to reproduce important observed diagnostics provides confidence that this is a good strategy for exploring tropical phenomena. An example that I'll talk about is the behavior of convective organization at different SSTs.

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