Idealized simulations of convective organization and moisture buildup during South China Sea monsoon onset

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The moisture development over South China Sea (SCS) plays an essential role in modulating the timing of summer monsoon onset. This moisture development is generally associated with the increasing number of organized convection over SCS. In this study, idealized simulations are designed to evaluate the causal relationship between the moisture buildup and organized convection using a vector vorticity equation cloud-resolving model (VVM). The results show that the topography surrounding SCS is important in geographical locking the coastal convection over SCS. In addition, when the diurnal convection is strong over land, strong subsidence occurs and the convection is suppressed over the ocean with random isolated deep convection. When the vertical wind shear is imposed, mimicking the change of large-scale circulation during onset, organized coastal convection develops and propagates toward the center of SCS. A critical column water vapor is therefore reached with the moisture transport of the propagating convection and possibly causes the onset of the SCS monsoon. An object-based tracking algorithm is developed to further examine the characteristics of organized convection. Preliminary results suggest that these propagating systems tend to be smaller in size with longer lifetime compared to the geographically locked coastal convection. The role of cold pool in these convective systems is also evaluated.

Keywords: cloud resolving model, organized convection, cloud tracking

