NCAR | CLIMATE & GLOBAL DYNAMICS

CGD Seminar Series

Understanding convection-environment interaction from high-res LES modeling and observations

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Time: 11am – 12pm

For Zoom information, please contact Tracy Baker tbaker@ucar.edu

For live stream information, visit the CGD Seminar Webpage

ABSTRACT

How moist convection interacts with its large-scale environment, is key to the Earth's radiation budget and the hydrological cycle, particularly the rainfall distribution and variability. Despite its well appreciated importance, our understanding of how clouds interact with the large-scale environment remains poor, so does our ability to simulate it. My research uses high-resolution numerical model experiments, together with observational data analysis, to guide development of theoretical models regarding this interaction, and to improve its representation in climate models.

In this talk, I will be primarily focused on two related topics: 1). What controls the turbulent mixing between clouds and environment? – One vital yet most uncertain process in convection representation. A novel Lagrangian analysis framework embedded within Large Eddy Simulation is used to probe into the underlying mechanism, and a new entrainment formula is proposed. Using the similar framework, a deterministic model is proposed to better represent updraft vertical velocity in convection scheme as well; 2). What controls the transition from shallow to deep convection? The insufficient understanding of which has induced a major drawback in reproducing the diurnal cycle of precipitation. A suite of airborne, ground-based and satellite observations is incorporated into a plume model to disentangle the relative contribution from surface and atmosphere, and reveal possible pathways underlying future droughts/floods.