Convective transition statistics for climate model diagnostics

David Neelin
University of California at Los Angeles
USA
neelin@ucla.edu

Abstract

An overview will be provided of work to systematically quantify fast-process diagnostics of deep tropical convection with multiplatform remote-sensing data, Atmospheric Radiation Measurement program field campaign in situ, radiometer and radar data, and reanalysis datasets to provide constraints for climate models. Precipitation statistics are emergent properties of the interaction of the fast- and slow- scales, so the relationship of assumptions in model subgrid scale parameterizations to these properties can be challenging to trace. Stochastic models simplified from climate model equations can point to hypotheses for the dynamics underlying these diagnostics and relationships among them, while parameter perturbation studies in the climate models provide perspective on what processes are being constrained, and on aspects affecting climate biases. Relationships of deep convective onset to moisture and temperature can be interpreted as empirical measures of leading degrees of freedom affecting plume buoyancy; parallels between onset measures for organized and cellular convection suggest usefulness of a deep inflow perspective on mixing in deep convective elements for convective parameterizations. Issues of model output protocols to facilitate diagnostics of fast time-scale relations will also be outlined.