Session: B6 Oral presentation

The aerosol-cloud-precipitation system: in search of simplicity

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The study of aerosol-cloud-precipitation interactions and its ramifications for climate forcing has been a focus of significant effort over the past decades. The fundamental cloud microphysical properties are driven by dynamics; vertical motions and mixing processes between the cloud and its environment determine the concentration of the condensed phase (water or ice). However aerosol particles can significantly affect the microphysics and dynamics of clouds by changing the size distribution of drops, their ability to grow to raindrops, their rates of evaporation, and their mixing with the environment.The physical system is strongly coupled and attempting to separate aerosol effects from meteorological variability has met with limited success. Increasing evidence suggests that much like other complex, coupled systems, the process-level, local interactions between elements that make up the aerosol-cloud-precipitation system generate system-wide patterns, or "emergent" behavior. In this talk we will explore the manner in which these process-level interactions manifest as emergent behavior or self-organizing patterns. We will also consider conceptual models that may in some cases be able to capture the emergent properties of the complex system with minimal computational expense.