MMM SEMINAR SERIES

Recent Advances in Parameterizing Microphysics for Cloud, Weather, and Climate Models

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The representation of cloud and precipitation microphysics is a critical element in atmospheric models of all scales. It affects the thermodynamics and dynamics from latent heating/cooling and condensate drag, strongly influences cloudy radiative transfer, and is a key component of the hydrological cycle through the generation and fallout of precipitation. An overview of the historical development of microphysics schemes in cloud and mesoscale models will be presented first. Advances over the last decade will be covered in more detail, particularly the recent development of a scheme called Predicted Particle Properties (P3) that predicts and smoothly evolves ice particle properties such as density and fall speed. This approach is a significant departure from traditional microphysics schemes that separate ice into categories with fixed properties corresponding to particular ice types (small ice, snow, graupel, hail, etc.). Simulations using P3 implemented in the Weather Research and Forecasting (WRF) model will be presented and contrasted with those using traditional schemes. Additional developments related to P3, including an improved numerical treatment of cloud and precipitation transport, will also be presented. Finally, more "outside of the box" ideas for parameterizing microphysics will be highlighted, including a Bayesian statistical-physical parameterization framework that facilitates observational constraint of process rates and a rigorous characterization of uncertainty. The talk with conclude with a broader outlook and commentary on future microphysics scheme developments over the next 5-10 years and beyond.

This seminar will be webcast live at:
http://ucarconnect.ucar.edu/live
Recorded seminar link can be viewed here:
https://www.mmm.ucar.edu/events/seminars

Thursday, 15 February 2018, 3:30 PM
Refreshments 3:15 PM
NCAR-Foothills Laboratory
3450 Mitchell Lane
Bldg. 2, Main Auditorium, Room 1022