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MMM SEMINAR *EOL*

Use of In-Situ Observations for Quantifying Ice Cloud Microphysical Properties and Processes, and their Uncertainties

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Some of the most fundamental and complex problems in climate and weather research today are our poor understanding of the basic properties of clouds and our inability to determine quantitatively the many effects that clouds have on weather and climate. The representation of ice microphysical processes such as riming, sedimentation, aggregation, evaporation and deposition has large effects on quantitative precipitation forecasts and the representation of fallout and single-scattering properties affects cloud feedbacks in climate models, yet there are large uncertainties in how to best represent these processes. To better understand controls of ice clouds, not only are modeling studies required but also multi-platform observations that form the basis of model parameterizations.

In this presentation, in-situ observations obtained by the University of Illinois group in varying environmental conditions are used to characterize uncertainties in derived ice properties, such as number distribution functions, total concentrations, effective radii, and fallout velocities. Sources of uncertainty include both instrumental errors and uncertainties associated with the processing of the data. A framework for including these uncertainties in parameterization schemes appropriate for numerical models and retrieval schemes is introduced, and preliminary results using this framework to describe the dependence of ice crystal properties on environmental conditions is presented. To explore implications of this framework, an example of a stochastic parameterization scheme is presented. In addition, the impacts of uncertainties in the shapes and concentrations of small ice crystal shapes on the calculation of shortwave and long wave radiative fluxes is examined. Plans for future research efforts to better constrain the representation of ice processes and properties and implications of these uncertainties finishes the presentation.

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Thursday, 15 October, 2015, 3:30 PM
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NCAR-Foothills Laboratory
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