****Please note, colloquium starts at 10:00am****

ATS/CIRA Colloquium

Hugh Morrison

Visiting ATS from NCAR

A new approach for parameterizing cloud microphysics based on the prediction of ice-phase particle properties

Hosted by Sue van den Heever

Wednesday, May 28, 2014

ATS room 101; Discussion will begin at 10:00am
Refreshments will be served at 9:45am in the weather lab

The representation of cloud microphysics continues to be a source of uncertainty in atmospheric models. Traditionally, microphysics schemes partition ice-phase particles into pre-defined categories with prescribed bulk characteristics. This approach, used in nearly all existing schemes, is intrinsically restrictive and imposes the need for conversion between categories, which is poorly constrained and often unphysical. A fundamentally different approach is proposed and serves as the basis for a new bulk microphysics scheme. In the new scheme, ice particle properties are predicted and evolve locally in time and space by prognosing four independent mixing ratio variables: total ice mass, rime ice mass, rime volume, and ice number. From these variables, important physical properties that describe the ice hydrometeors at any point in time and space can be derived with four degrees of freedom. This allows the full range of ice particle types to be represented by a single ice category. The new approach thus eliminates the need for conversion rates and thresholds between different ice categories.

The behavior of the new scheme is illustrated with 3D simulations using the Weather Research and Forecasting (WRF) model over a wide range of conditions, including winter orographic precipitation and different types of convective storms. Results are compared to observations and simulations using other bulk microphysics schemes. Despite its simplicity, the new scheme produces a realistic simulation of meteorological phenomena and with a limited computational cost compared to other schemes.

Link to colloquium videos and announcement page: http://www.atmos.colostate.edu/dept/colloquia.php