Joint CGD/EOL Seminar

A critical view of the warm rain process in marine stratocumulus observations and numerical models

Jorgen B. Jensen, NCAR/EOL

The results of LES bin microphysics models have previously been used to parameterize the warm rain process in bulk microphysics schemes (e.g. Khairoutdinov and Kogan, 2000; KK2000). As such models develop warm rain in marine stratocumulus, and as they typically only treat drops grown on small aerosol particles, it is perhaps not surprising that almost all climate models parameterize the formation of warm rain based on drop parameters that are primarily sensitive to small aerosol particles (e.g. mean cloud droplet radius and cloud droplet concentration, or combinations thereof).

This study examines in some detail selected drop growth processes leading to initial drizzle formation (the so-called autoconversion rate). This is done in three ways: (i) By examining the underlying equations used in bin microphysics models, and by demonstrating how drop mixing, which is treated as a conservative mixing processes, should be treated as a non-conservative process; (ii) by calculating the autoconversion rates based on observations of drop spectra from the VOCALS and HIPPO-4 field deployment and comparing them to the KK2000 parameterization for the same situations; and (iii) by calculating the autoconversion rate for VOCALS marine stratocumulus using a simple box model of drop growth on giant sea-salt aerosol particles.

The calculations cast considerable doubt on the commonly used method of parameterizing autoconversion based on droplets formed on small aerosol particles.

Tuesday, 25 March 2014
3:30 p.m.
Mesa Lab, Main Seminar Room
NCAR, 1850 Table Mesa Drive

Seminars are live webcast: http://www.fin.ucar.edu/it/mms/ml-live.htm
* Refreshments are served before seminar. *
For more information, contact Gaylynn Potemkin, email potemkin@ucar.edu, phone: 303.497.1618