

ATS/CIRA Colloquium

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**Visiting CSU ATS from Dept. of Meteorology
The Pennsylvania State University**

Understanding Arctic Mixed-Phase Clouds: Use of Doppler Velocity Spectra

Hosted by Sue van den Heever

Thursday, February 7, 2013

**ATS room 101; Discussion will begin at 3:30pm
Refreshments will be served at 3:00pm in the weather lab**

Observations reveal that long-lasting, mixed-phased stratiform clouds may be observed in all months of the year in the Arctic lower troposphere. These clouds have a large impact on radiative transfer through the atmosphere, and hence the surface energy budget. The ability of these clouds to persist for several days remains perplexing, because liquid-ice mixtures are inherently unstable and will glaciate. Modeling studies have suggested several processes operating on the local level that may contribute to their persistence. All these processes suggest close coupling between dynamical and microphysical processes. However, it is very difficult to obtain observations that simultaneously inform on the dynamics and microphysics. We use Doppler velocity spectra measured by millimeter wave profiling radars to evaluate the fidelity on cloud resolving model simulations of persistent mixed-phase stratus clouds. A Doppler spectrum contains information about the hydrometeor fall spectrum, the volume mean turbulence (sub-grid scale fluctuations) and vertical motion. The hydrometeor fall spectrum depends on the characteristics (size, phase, shape/habit, fall speeds) of the hydrometeors and their size distributions. Our work includes both forward modeling of observations from simulation output and decomposition of in-cloud Doppler spectra into liquid/ice hydrometeor classes.

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