

ATS/CIRA Colloquium

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**Modifications to a Partially Double Moment Microphysics
Parameterization for Hurricane Simulations**

Hosted by Michael Bell

Monday, October 24, 2016

**ATS room 101; Discussion will begin at 1:30pm
Refreshments will be served at 1:00pm in the weather lab**

Polarimetric upgrades to the U.S. radar network have allowed new insight into the precipitation processes of tropical cyclones. Previous work by the authors compared the horizontal and differential reflectivity observations from two hurricanes to simulated radar observations from the WRF model, and found that the aerosol-aware Thompson microphysical scheme performed the best of several commonly used microphysical parameterizations. Here, we expand our investigation of the Thompson scheme, and find that though it provided the most accurate forecast in terms of wind speed and simulated radar signatures, the Thompson scheme produces areas in which the differential reflectivity was much higher than observed. With additional validation from the Dual wavelength Precipitation Radar on board the Global Precipitation Measurement satellite, we conclude that the Thompson scheme produces drop size distributions that have a larger median drop size than observed in regions of light stratiform precipitation for the two hurricanes studied. Examination of the vertical structure of simulated differential reflectivity indicates that the source of the discrepancy between the model and radar observations likely originates above or at the melting layer. The treatment of number production of rain drops from melting snow in the Thompson microphysical scheme is shown to be the ultimate source of the enhancement of differential reflectivity. A modification to the scheme is shown to result in better fidelity of the radar variables with the observations without degrading the intensity forecast. The modifications to the Thompson scheme shown here have been incorporated into updates of the WRF model starting with version 3.8.1.

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