**Investigating the Impacts of Dust on Deep Convective Clouds Using Detailed Spectral Bin Microphysics**

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Dust aerosols have significant impacts on the observed microphysical and macrophysical characteristics of deep convective cloud (DCC) systems. A case study investigating these changes was undertaken using the Weather Research and Forecasting (WRF) model coupled with a Spectral Bin Microphysics (SBM) model. Detailed ice formation processes have been added to the SBM to directly connect dust with heterogeneous ice formation within DCCs. Ice nuclei (IN) in the dust layer was tested at three concentrations: 0.12, 1.2 and 12.0 cm-3. Homogenous freezing was reduced ~40% per IN magnitude increase from 0.12 cm-3, while heterogeneous freezing increased ~30%. Increased riming of smaller more numerous midlevel ice particles increased small graupel formation up to two orders of magnitude proportional to IN, with similar reduction in liquid content. Updraft intensity (occurrence frequency) increased ~2 m/s (~8%) per IN magnitude increase. Average cloud top height and glaciation altitude lowered ~1km and ~1.5km per IN magnitude increase. Particle size distribution (PSD) was narrowed at cloud top due to increased collection of small particles and competition limiting individual particle growth. Precipitation particle number was reduced up to 50% near 0°C and increased up 25% near -38°C. Total surface precipitation accumulation was reduced ~2.4% per IN magnitude increase.