2.077 The Holistic Interactions of Shallow Clouds, Aerosols, and Land-Ecosystems Campaign: Measurement Strategy and Preliminary Findings.

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Abstract:

We describe the measurement strategy and preliminary findings from the Holistic Interactions of Shallow Clouds, Aerosols, and Land-Ecosystems (HI-SCALE) campaign that will be conducted in May and September of 2016 in the vicinity of the DOE's Atmospheric Radiation Measurement (ARM) Southern Great Plains (SGP) site located in Oklahoma. Current shallow and deep convective cloud parameterizations used by regional and global models contain uncertainties resulting from insufficient coincident data that couples cloud macrophysical and microphysical properties to inhomogeneity in land use and ecosystems, boundary layer turbulence, and aerosol properties. Rather than targeting specific processes as has been done in previous campaigns, the goal of the HI-SCALE campaign is to provide a detailed set of aircraft and surface measurements needed to obtain a more complete understanding and improved parameterizations of the lifecycle of shallow clouds. Aerosol and aerosol precursor measurements on the research aircraft are made using a High Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS), a single particle mass spectrometer (miniSPLAT), and a chemical ionization mass spectrometer (CIMS). Similar measurements will be continuously collected at the surface. The sampling will be done in two periods, one in the spring and the other in the late summer to take advantage of variations in the "greenness" for various types of vegetation, new particle formation, anthropogenic enhancement of biogenic secondary organic aerosol (SOA), and other aerosol properties. The aircraft measurements will be

coupled with extensive routine ARM SGP measurements as well as Large Eddy Simulation (LES), cloud resolving, and cloud-system resolving models. Through these integrated analyses and modeling studies, the affects of inhomogeneity in land use, vegetation, soil moisture, convective eddies, and aerosol properties on the evolution of shallow clouds will be determined, including the feedbacks of cloud radiative effects.