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THE MID-LATITUDE CONTINENTAL CONVECTIVE CLOUDS EXPERIMENT (MC3E)

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ABSTRACT

The Midlatitude Continental Convective Cloud Experiment (MC3E) will take place in central Oklahoma during the April-May 2011 period. The experiment is a collaborative effort between the U.S. Department of Energy Atmospheric Radition Measurement Program and the National Aeronautics and Space Administration's (NASA) Global Precipitation Measurement (GPM) mission Ground Validation program. The Intensive Observation Period leverages the unprecedented observing infrastructure currently available in the central United States, combined with an extensive sounding array, remote sensing and in situ aircraft observations, NASA GPM ground validation remote sensors and new ARM instrumentation purchased with American Recovery and Reinvestment Act funding. The overarching goal is to provide the most complete characterization of convective cloud systems, precipitation and the environment that has ever been obtained, providing constraints for model cumulus parameterizations and space-based rainfall observations over land that have never before been available. Several different components of convective processes tangible to the convective parameterization problem are targeted such as, pre-convective environment and convective initiation, updraft / downdraft dynamics, condensate transport and detrainment, precipitation and cloud microphysics, influence on the environment and radiation and a detailed description of the large-scale forcing.

MC3E will use a new multi-scale observing strategy with the participation of a network of distributed sensors (both passive and active). The approach is to document in 3-D not only the full spectrum of precipitation rates, but also clouds, winds and moisture in an attempt to provide a holistic view of convective clouds and their feedback with the environment. A goal is to measure cloud and precipitation transitions and environmental quantities that are important for satellite retrieval algorithms, convective parameterization in large-scale models and cloud-resolving model simulations. This will be accomplished through the deployment of several different elements that complement the existing (and soon to become available) ARM facilities: a network of radiosonde stations, NASA scanning multi-frequency/parameter radar systems at three different frequencies (Ka/Ku/S), high-altitude remote sensing and in situ aircraft, wind profilers and a network of surface disdrometers. In addition to these special MC3E instruments, there will be important new instrumentation deployed by DOE at the ARM site including: 3 networked scanning X-band radar systems, a C-band scanning radar, a dual wavelength (Ka/W) scanning cloud radar, a Doppler lidar and upgraded vertically pointing millimeter cloud radar (MMCR) and micropulse lidar (MPL).To fully describe the properties of precipitating cloud systems, both in situ and remote sensing airborne observations are necessary. The NASA GPM-funded University of North Dakota (UND) Citation will provide in situ observations of precipitation-sized particles, ice freezing nuclei and aerosol concentrations. As a complement to the UND Citation's in situ observations, the NASA ER-2 will provide a high altitude satellite simulator platform that carrying a Ka/Ku band radar and passive microwave radiometers (10-183 GHZ).

This poster will be displayed at ASR Science Team Meeting.