CONTROL ID: 1488231

TITLE: Overview of the Deep Convective Clouds and Chemistry Experiment *(Invited)*

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ABSTRACT BODY: The Deep Convective Clouds and Chemistry (DC3) project conducted a 7-week field campaign during May and June 2012 to study thunderstorm dynamical, physical, and electrical characteristics, as well as their effects on the atmosphere's composition, especially ozone and particles in the climate-sensitive upper troposphere near the thunderstorm tops. The NSF/NCAR Gulfstream V (GV) and the NASA DC-8 aircraft flew 17 coordinated flights to sample low-level inflow and upper troposphere outflow air near thunderstorms and to sample convective outflow air as it chemically aged during the next 24 hours. The DLR Falcon aircraft observed the fresh storm outflow and also obtained measurements of aged outflow. In total, 19 cases of active thunderstorms and over 6 cases of photochemical aging were flown.

The DC3 aircraft, based in Salina, Kansas, were equipped with instruments to measure a variety of gases, aerosols, and cloud particle characteristics in situ as well as the NASA DC-8 measuring the ozone and aerosol distribution by lidar. The aircraft targeted storms predicted to occur within range of coverage by ground-based radar pairs, lightning mapping arrays (LMAs), and frequent launches of balloon-borne instruments that could measure the storm's physical, kinematic, and lightning characteristics. This coverage occurred in three regions: 1) northeastern Colorado, 2) central Oklahoma to western Texas, and 3) northern Alabama. DC3 demonstrated that it is possible to sample with two aircraft the inflow and outflow of storms, which were simultaneously sampled by the ground radars, LMAs, and soundings.

The DC3 data set is extensive and rich. This presentation will summarize the overall statistics of the DC3 measurements giving a general idea of storm characteristics, transport of trace gases, and photochemical aging of species. Examples will be given of specific thunderstorm cases, including a Colorado case where a biomass-burning plume was ingested by a storm, and of sampling a thunderstorm, forecasting the location of the convective outflow plume the next day, and sampling the Day 2 convective outflow. In addition, the photochemical aging of convective outflow air from a decaying Mesoscale Convective System will be highlighted.

KEYWORDS: [0365] ATMOSPHERIC COMPOSITION AND STRUCTURE / Troposphere: composition and chemistry, [0368] ATMOSPHERIC COMPOSITION AND STRUCTURE / Troposphere: constituent transport and chemistry.

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Additional Details

Previously Presented Material: 5% at AGU Fall Meeting

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