*****Please note the special date and time*****

ATS/CIRA Colloquium

Mary C. Barth

National Center for Atmospheric Research

Boulder, Colorado

Effects of Thunderstorms on Tropospheric Trace Gas Chemistry

Hosted by Steven Rutledge

Thursday, April 30, 2015

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

Thunderstorms are interesting from an atmospheric chemistry perspective because their convective outflow regions produce ozone in the upper troposphere, where ozone is radiatively active as a greenhouse gas. The ozone production comes about because the convective outflow contains an abundance of ozone precursors: hydrogen oxides (HOx) radicals and their precursors, as well as nitrogen oxides (NOx). Boundary layer air, rich in hydrocarbons, other HOx precursors, and NOx, is rapidly transported from the surface to the upper troposphere by deep convection. However, the soluble trace gases can be completely or partially removed by precipitation. Further, lightning produces NOx, providing a strong source of NOx to the upper troposphere. To gain a better understanding of the effects of thunderstorms on atmospheric chemistry, the Deep Convective Clouds and Chemistry (DC3) field campaign was conducted in May-June 2012 producing an excellent dataset of the composition of the inflow and outflow regions, storm structure, kinematics and lightning activity of a variety of thunderstorms.

This presentation will highlight recent findings from the DC3 field project. Examining the convective transport of the highly soluble hydrogen peroxide and less soluble methyl hydrogen peroxide trace gases, which are HOx precursors, will be the main focus of the talk. Several thunderstorms are analyzed to determine the scavenging efficiency of these two peroxide species. While the highly soluble hydrogen peroxide is readily scavenged with scavenging efficiencies over 80%, the less soluble methyl hydrogen peroxide has a much greater range of scavenging efficiencies (15-83%). Reasons for the wide range of scavenging efficiencies of methyl hydrogen peroxide are not known, but may be related to the degree of entrainment in each storm or the time in contact with liquid drops.

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