MMM SEMINAR SERIES

Vertical Transport of Trace Gases and Aerosols in Deep Convection: Analysis of Observations from the SEAC 4 RS and DC3 Field Campaigns

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Convective storms over the central U.S. are often an everyday occurrence during the late spring and summer and have a significant impact on upper troposphere composition affecting water vapor, ozone, and aerosols; constituents that affect the radiative forcing of the climate system. Two key processes in deep convection are vertical transport and removal of constituents by microphysical scavenging. In this work, we determine scavenging efficiencies of soluble trace gases and aerosol mass concentrations based on observations from the Deep Convective Clouds and Chemistry (DC3) and the Studies of Emissions, Atmospheric Composition, Clouds and Climate Coupling by Regional Surveys (SEAC 4 RS) field experiments combined with process scale modeling. In general, scavenging efficiencies do not change substantially in different types of storms. However, we find that formaldehyde is partly affected by the cloud physics. Specifically, the retention of formaldehyde in freezing cloud drops varies with the severity of the storm, suggesting ice shattering may be releasing formaldehyde to the gas phase. Another surprising finding was that aerosol nitrate scavenging efficiencies were often less than those of other aerosol species. Further analysis shows the role of entrainment and lightning-production of nitrogen oxides in affecting the aerosol nitrate redistribution. These results highlight the complex interactions between dynamics, physics, and chemistry in thunderstorms that all need to be represented well in chemistry transport models.

Thursday, 17 August 2023, 2:00pm

Refreshments 1:45pm

Please also join colleagues for refreshments and informal discussion after the seminar until 3:30pm

NCAR-Foothills Laboratory, 3450 Mitchell Lane
FL2-1022, Large Auditorium

Seminar will also be live webcast

https://operations.ucar.edu/live-mmm

Participants may ask questions during the seminar via Slido.