

SEMINAR

Thunderstorm Effects on Tropospheric Composition

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Abstract:

Thunderstorms can be viewed as processors of trace gases in the atmosphere via convective transport, scavenging by cloud particles, lightning production of nitrogen oxides, and cloud chemistry. Because the kinematics, physics, and lightning can vary from storm to storm, it is especially challenging to understand how each process modifies tropospheric composition. For example, the redistribution of trace gases and aerosols in an ordinary, airmass thunderstorm can be quite different than that in severe storms, such as those experienced over the central United States. This talk will review what we have learned about thunderstorms and chemistry over the past 25 years, with special emphasis on recent results from the Deep Convective Clouds and Chemistry (DC3) field experiment that was conducted in May-June 2012.

In this talk, I will focus on the convective transport of the highly soluble hydrogen peroxide and less soluble methyl hydrogen peroxide trace gases. Both of these trace gases are important for producing hydrogen oxides and subsequently ozone. Several thunderstorms from the DC3 field campaign 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 (12-84%). To determine why methyl hydrogen peroxide can have such high scavenging efficiencies, its estimated scavenging efficiencies are compared to several factors associated with each storm case. It is found that entrainment rates, the role of ice in scavenging these gases, and possibly nitrogen oxide levels are correlated with the amount of methyl hydrogen peroxide scavenging.

Date: Monday, February 29, 2016

Time: 3:15 Refreshments, 3:30 Seminar

Where: FL-1022, Large Auditorium

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