ATS/CIRA Colloquium

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Efficiently Elucidating Emissions Influences on Aspects of Air Quality and Climate

Hosted by Tammy Thompson

Friday, October 30, 2015

ATS room 101; Discussion will begin at 11:15am
Refreshments will be served at 10:45am in the weather lab

Anthropogenic influence on the composition of the atmosphere has caused harm to human health, shifts in climate, and perturbations to ecosystems. Assessing the relative influence of specific sources on various air quality and climate endpoints enables evaluation of tradeoffs between emissions reduction strategies and technological pathways to meeting environmental goals. The adjoint of a model calculates the relative importance of many model parameters on select endpoints with analytical accuracy.

Here, I use the GEOS-Chem adjoint to evaluate emissions influences on radiative forcing due to aerosol impacting cloud droplet number concentration in select months of 2008. Shifting to a regional modeling approach with CMAQ, I show a range of co-benefits to crops and trees due to projected Clean Power Plan emissions reductions. Additionally, with the CMAQ adjoint I evaluate of the impacts of location-specific emissions of volatile organic compounds and oxides of nitrogen on urban ozone concentrations, which can be used to estimate the air quality impacts of revised oil and gas emissions estimates. Finally, the first steps toward assimilation of ammonia observations from the Tropospheric Emissions Spectrometer during the CalNex campaign are shown. By introducing the concept of adjoints in chemical transport models and demonstrating various applications, I aim to deepen understanding of this computational approach and to provide a foundation upon which future collaborations may be established.

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