Analytical Seminar

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"Punching back the last frontier in U.S. air quality: Odd oxygen, odd nitrogen and winter atmospheric chemistry"

Air quality has improved dramatically across most of the United States in recent decades due to reductions in emissions of primary air pollutants. These improvements represent a major environmental success story. Nevertheless, there remain a few areas in violation of national standards for fine particulate matter (diameter smaller than 2.5 microns, $PM_{2.5}$). These regions are generally subject to winter air pollution, suggesting that understanding of winter atmospheric chemistry and its interaction with cold-weather meteorology is key to the development of effective strategies for further advances. The relevant atmospheric chemical cycles involve odd oxygen (O_3 and the nitrogen species with which it reacts), odd (or reactive) nitrogen, reduced nitrogen, heterogeneous (gas-particle) reactions and the activation of halogens from particulate salts to photolabile species. Two recent aircraft-based field campaigns have provided a unique look at winter atmospheric composition. The 2015 Wintertime Investigation of Transport, Emissions and Reactivity (WINTER) surveyed the U.S. East coast during January and February with the heavily instrumented NSF C130 research aircraft. The 2017 Utah Winter Fine Particulate Study (UWFPS) utilized the NOAA Twin Otter in a focused study of Salt Lake City and surrounding mountain basins, a region that is subject to particularly severe winter air pollution. These two studies have led to new insights into the chemical mechanisms that underlie winter air pollution. The developing analysis suggests new directions for mitigation strategies and may help to explain why areas subject to winter air pollution have not responded as strongly to recent emissions reductions.

Thursday
September 27

12:15 p.m.
1315 Chemistry

Coffee & cookies
at 12 p.m.

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