



AIR AND WATER RESOURCES ENGINEERING SEMINAR

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Satellite-detection and attribution of rapid increases in tropospheric ozone made in China and its influence on the western United States

Elevated concentrations of tropospheric ozone (O_3) have direct adverse effects on man and ecosystems, contribute to positive radiative forcing, and drive the production of hydroxyl (OH), which controls the chemical lifetime of many atmospheric pollutants and some greenhouse gases. In situ measurements suggest that changes in average tropospheric O_3 concentration have flattened in the 2000s, following substantial increases in the 1980s and 1990s, possibly in response to changes in the emissions of precursor nitrogen oxides (NO_x) and hydrocarbons. In contrast, local measurements show that tropospheric O_3 over Asia continues to increase into the 2000s at a substantial pace. This increase in Asian O_3 is often incurred to explain trends observed at North America's West Coast, but to date there is no unambiguous evidence showing that enhanced Asian pollution is actually driving changes in O_3 over the western United States. Here we show a strong and rapid increase (~ 7 ppbv, or 10% per year) in free tropospheric O_3 concentrations over China retrieved with the TES satellite instrument from 2005 to 2010. We attribute this increase to a stronger inflow of stratospheric O_3 and to enhanced O_3 production following highly significant increases in Chinese NO_x emissions as observed with the OMI satellite instrument. Over the western United States, increased stratosphere-troposphere exchange and inflow of ozone made in China offset any effects of local NO_x emission reductions.

Date: Monday, April 28, 2014

Place: ETRL 101

Time: 4:10 p.m.—5:00 p.m.