Wildfire emissions and their interaction with urban and rural pollution: data and simulations

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In recent years NASA has conducted a series of airborne campaigns (e. g. SEAC4RS*, ARCTAS, INTEX-A/B) over North America using an instrumented DC-8 aircraft equipped to measure a very large number of gaseous and aerosol constituents including several unique tracers. In these campaigns wild fires were extensively sampled near source as well as downwind after aging. The data provided detailed information on the composition and chemistry of fire emissions under a variety of atmospheric conditions as well as their interactions with rural and urban air pollution. Major fires studied including the California Rim fire in 2013 (SEAC4RS), the 2008 California wildfires (ARCTAS), and the Alaskan fires downwind over eastern US (INTEX-A). Although some fire plumes contained virtually no O_3 enhancement, others showed significant ozone formation. Over Los Angeles, the highest O_3 mixing ratios were observed in fire influenced urban air masses. Attempts to simulate these interactions using state of the art models were only minimally successful and indicated several shortcomings in simulating fire emission influences on urban smog formation. A variety of secondary oxidation products (e. g. O_3, PAN, HCHO) were substantially underestimated. We will discuss the data collected in fire influenced air masses and their potential air quality implications

*SEAC4RS: Studies of Emissions and Atmospheric Composition, Clouds and Climate; ARCTAS: Arctic Research of the Composition of the Troposphere from Aircraft and Satellites; INTEX-A/B: Intercontinental Chemical Transport Experiment-A/B