2.089 Investigating the effects of aged wildfire smoke on photochemistry in the Northern Front Range of Colorado.

Early Career Scientist

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Abstract:

Wildfires are likely to increase in frequency and intensity in the future and human populations are likely to be increasingly affected by wildfire smoke. Wildfire smoke contains a complex mixture of trace species, including aerosols and ozone precursors. The Northern Front Range Metropolitan Area of Colorado (encompassing Denver and the surrounding municipalities along the eastern edge of the Rocky Mountains) is one of the fastest growing metropolitan regions in the country and new technologies have led to a boom in oil and gas extraction in the adjacent Denver-Julesberg Basin. Here we present an analysis of two aged wildfire plume events in the Front Range based on data collected at the NOAA Boulder Atmospheric Observatory (BAO) tower in northeastern Colorado during summer (3 July through 7 September) 2015. During this campaign, we measured a broad suite of VOCs, NO_x, and several oxidized nitrogen species (nitric acid, peroxy acyl nitrates (PANs), and alkyl nitrates) in addition to O_3, CH_4, CO_2, and CO. Each smoke event lasted several days, and included weekend and weekday days. From 6 July through 10 July smoke from wildfires in British Columbia was present in the Front Range and 16 August through 26 August was influenced by smoke originating in Washington and Oregon. The presence of smoke is apparent in the data as strongly elevated CO (a mean of 259 ppbv during smoke events vs. 161 ppbv during rest of campaign), PAN, PPN and benzene. Smoke was present on 6 out of 21 high ozone days during the campaign (defined as hourly O3 > 70 ppbv).