2.004 Ozone Enhancement and Attribution to Wildfires: A Study in the Colorado Front Range.

Early Career Scientist

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Abstract:

Ozone plays an important role on the oxidation capacity and radiative forcing of the atmosphere and at ground-level has negative impacts on human health and ecosystem processes. The Colorado Front Range (CFR) is a region of intricate interactions between multiple pollutant sources and complex meteorological conditions which can result in the accumulation of ozone at ground level. Biomass burning and wildfires have been known to emit a suite of particulate matter and gaseous compounds into the atmosphere which can affect the photochemical processes of ozone. The CFR experiences frequent fires and is impacted by transport of fire related pollutants during the May-September fire season. The extent to which biomass burning pollutants impact air quality depends on many contributing factors, such as, fire size and age, type of material burned, proportions of emitted gas, particulate matter, meteorological conditions, and available NOx and VOC's. As the climate in the Western United States warms and dries, the conditions and regime of fires and dominant vegetation will be altered. This study demonstrates the importance of understanding the influence of biomass burning on surface ozone mixing ratios in a rapidly changing climate. High ozone events in the CFR associated with fires are analyzed to develop understanding of the influence and variability of ozone and wildfire relationships. A variety of models, satellite imagery, and co-located in-situ measurements are used to characterize the surface ozone conditions in the CFR during wildfire season. These additional measurements and models allow for in depth investigation and understanding of the air parcel origin, chemistry, and movement. This study provides analysis of the frequency and conditions conducive to enhanced ozone episodes which can be confirmed to be transported within and affected by the chemicals and conditions of fires and smoke plumes.