**ORGANIC AEROSOL COMPOSITION in YOSEMITE NATIONAL PARK**

Results from the 2002 Yosemite Aerosol Characterization Study (YACS)

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**Introduction**

Smoke, released from prescribed or wild fires, comprises a significant fraction of fine atmospheric particulate matter in many areas and thus contributes to regional haze and visibility degradation. Fine particle carbon can constitute more than half of total fine particle mass in parts of the western U.S., such as in Yosemite National Park. Therefore, it is important to investigate its sources.

**Overview**

Physicochemical properties of the ambient aerosol in Yosemite National Park were measured for two months during the summer of 2002 in order to investigate sources of haze and the resulting visibility impact. In particular, the influence of wildfires on the regional haze was determined. In addition, secondary biogenic aerosol species were identified as important PM2.5 constituents. Size distributions of individual organic aerosol species were determined as well.

**Wood Smoke Tracers**

All wood smoke marker concentrations showed a diurnal pattern that coincides with the diurnal change in wind direction that was observed throughout the entire study period. During the day, air masses were carried up-slope to Yosemite from the West, while at night down-slope flow out of Yosemite Valley prevailed.

**Size Distributions**

Certain compounds, including n-alkanes and n-alkanoic acids, were detected in particles of a relatively wide size range, while others were present only in sub-micrometer particles (e.g., hopanes, dicarboxylic acids, and selected pinenol oxidation products). In addition, certain organic species, such as 2,4-dehydroabietic acid, showed a bi-modal distribution.

**Wildfire Impact**

Significant influence of wildfires on PM2.5 mass in Yosemite was illustrated by high concentrations of smoke wood markers during certain periods. Contributions of smoke from biomass burning to the total fine POM during these periods were estimated based on selected molecular markers, including resin acids, anhydrosugars, sterols, and methoxyphenols. The highest source contributions from biomass burning were observed during week 5, when wood smoke appeared to be the dominant POM source. Additional data, including dual-channel (UV-vis) nephelometer black carbon (BC), soluble potassium concentrations, satellites images, and back trajectories, support the molecular marker observations.

**Conclusions**

Class 1 areas in the Western United States, such as Yosemite National Park, can be significantly impacted by haze due to high concentrations of fine aerosol particles, leading to poor visibility. The main component of the fine aerosol mass in Yosemite is particulate organic matter (POM). During the summer of 2002, POM in Yosemite was dominated by emissions from natural sources, in particular by wildfire smoke and secondary organic species from biogenic sources.

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