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Effects of Atmospheric Aging on Light Absorptivity and Oxidative Potential of Biomass Burning Organic Aerosols

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While the effects of aging on the mass, chemical composition, and hygroscopicity of organic aerosols are becoming better understood, the corresponding impacts on their direct radiative forcing and adverse health effects remain unclear. Through a combination of laboratory experiments and field observations, the objective of this work is to investigate the effects of atmospheric processing on the light absorptivity and oxidative potential (ability to generate Reactive Oxygen Species, ROS) of biomass burning organic aerosols (BBOA). In the laboratory, changes in the light absorptivity of molecular weight separated BBOA due to photochemical aging were systemically examined. Results suggest that the extent to which photo-bleaching and photo-enhancement occurs is dependent on the molecular weight fraction of BBOA. The effects of atmospheric aging on ambient BBOA, using filter samples collected in Crete, Greece, were also investigated. Focusing on samples that transition from freshly emitted to highly aged BBOA, results suggest that light absorbing large molecular weight compounds can be long-lived components in BBOA, thus more likely to have a larger impact on the aerosol direct radiative forcing. To better understand the health impacts of BBOA, results elucidating the role of atmospheric aging on their oxidative potential will also be presented.