

Individual Aerosol Particles from Wildfires: Transmission Electron Microscopy Analysis Revealing Tarball, Ash, and Potassium-Salt Particles

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Abstract

Wildfires emit significant amounts of aerosol particles into the atmosphere. Their composition, mixing state, and abundance need to be understood to clarify their impact on climate and air quality. This study provides this information based on individual particle analysis using transmission electron microscopy (TEM). Of particular interest were tarball, ash, and potassium salt particles. Aerosol samples were collected from wildfires in the United States (FIREX-AQ campaign), Asia (Thailand observation and ASIA-AQ campaign), and the Arctic region (Greenland and Svalbard) by aircraft and from ground observations. Tarballs are a class of organic particles with unique spherical shapes and have light-absorbing properties. Ash aerosol particles were found to be smaller than 1 micrometer in biomass burning smoke by TEM measurements. Potassium is commonly used as a tracer of biomass burning aerosol particles, which have a wide range of mixing states and compositions depending on their aging processes in the atmosphere. This study will show their formation processes and abundance in biomass burning smoke, as well as their shapes and mixing states at the individual particle scale. These results will be useful for understanding their chemical processes, optical properties, and ability to form cloud droplets and ice crystals and will have implications for the climate and air quality studies.

Early Career Scientist

NO, I am not an early career scientist.

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