



3-wavelength photoacoustic spectrophone for filter-free measurement of aerosol particle light absorption

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In the present work, a 3-wavelength photoacoustic spectrophone (3-wavelength PAS) was developed for direct and filter-free measurements of wavelength-dependent MAC (mass absorption coefficient) and AAC (absorption Ångström coefficient) of black carbon (BC), volcanic ash samples and environmental particulate matter (PM). MAC of BC was measured for validation and characterization of the 3-wavelength PAS instrument, via comparison with reference measurements. After the validation, MAC of Eyjafjallajökull volcanic ash samples were measured in lab, with a result in good agreement with the value obtained using a reference instrument. The developed 3-wavelength PAS was then deployed to a national campaign for field test via inter-comparison with a reference aethalometer (Magee AE33). Good linear correlations are observed with regression coefficients of $R > 0.90$. Real-time optical monitoring of evolution of optical properties of the SOA (secondary organic aerosol) produced from photolysis of 2-nitrophenol was carried out in an atmospheric simulation chamber. Simultaneous measurements of the extinction (in conjunction with a IBBCEAS instrument) and absorption (by PAS) coefficients of the SOA at 450 nm allowed us to determine its single scattering albedo (SSA) parameter at 450 nm during the whole production process.

The experimental detail, the preliminary measurement results and the corresponding data analysis will be presented.

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