



Aerosol optical absorption measurements with photoacoustic spectroscopy

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Many parameters related to radiative forcing in climate research are known only with large uncertainties. And one of the largest uncertainties in global radiative forcing is the contribution from aerosols. Aerosols can scatter or absorb the electromagnetic radiation, thus may have negative or positive effects on the radiative forcing of the atmosphere, respectively [1]. And the magnitude of the effect is directly related to the quantity of light absorbed by aerosols [2,3]. Thus, sensitivity and precision measurement of aerosol optical absorption is crucial for climate research. Photoacoustic spectroscopy (PAS) is commonly recognized as one of the best candidates to measure the light absorption of aerosols [4]. A PAS based sensor for aerosol optical absorption measurement was developed. A 532 nm semiconductor laser with an effective power of 160 mW was used as a light source of the PAS sensor. The PAS sensor was calibrated by using known concentration NO_2 . The minimum detectable optical absorption coefficient (OAC) of aerosol was determined to be 1 Mm^{-1} . 24 hours continuous measurement of OAC of aerosol in the ambient air was carried out. And a novel three wavelength PAS aerosol OAC sensor is in development for analysis of aerosol wavelength-dependent absorption Angstrom coefficient.

Reference

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