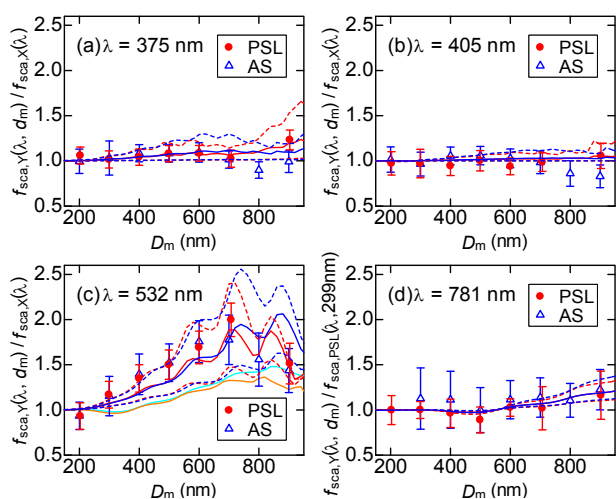


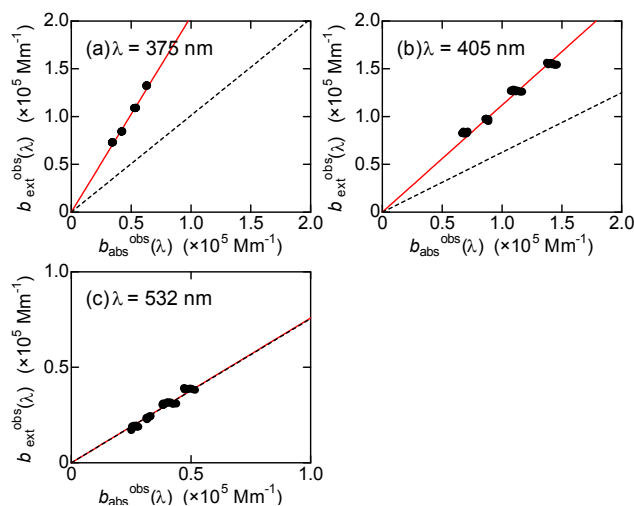
Nakayama, T., H. Suzuki, S. Kagamitani, Y. Ikeda, A. Uchiyama, and Y. Matsumi, 2015: Characterization of a three wavelength photoacoustic soot spectrometer (PASS-3) and a photoacoustic extinciometer (PAX). *J. Meteor. Soc. Japan*, **93**, 285-308.

<https://doi.org/10.2151/jmsj.2015-016>



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Figure 1. Particle size dependencies of averaged calibration factors for scattering measurements, normalized to those determined using Rayleigh scattering by gaseous molecules or polystyrene latex (PSL) particle with a diameter of 299 nm. Red filled circles and blue open triangles represent the results for mono-disperse PSL and ammonium sulfate particles, respectively.



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Figure 2. Examples of correlation plots between observed absorption coefficients for NO₂ gas and extinction coefficients determined from the change in light intensity passing through the cell. The slopes represent the calibration factors for absorption measurements. The slopes of black dashed lines equal the factors determined using poly-disperse propane soot particles.

- Performance of two commercially available instruments, three-wavelength photoacoustic soot spectrometer (PASS-3, $\lambda = 405, 532, 781$ nm) and photoacoustic extinciometer (PAX, $\lambda = 375$ nm), for the measurement of the light absorption and scattering coefficients of aerosols based on photoacoustic spectroscopy and reciprocal nephelometry were characterized.
- A significant particle size dependency was observed for the calibration factors for scattering measurements at 532 nm, likely due to a combination of differences in the polarization states of the lasers relative to the scattering planes and the large truncation angle, while no significant particle size dependencies were observed at 375, 405, and 781 nm (Fig. 1).
- The calibration factors for absorption measurements determined based on the light absorption of NO₂ molecules at 375 and 405 nm were 48 and 36% smaller than those for the poly-disperse soot particles, likely due to the influence of photolysis of NO₂, although good agreement was observed at 532 nm (Fig. 2).