

Uchiyama, A., 2014: Method to retrieve single scattering properties of aerosols using multi-wavelength scattering and absorption coefficient data measured by integrating nephelometer and absorption photometer. *J. Meteor. Soc. Japan*, **92A**, 71-91.

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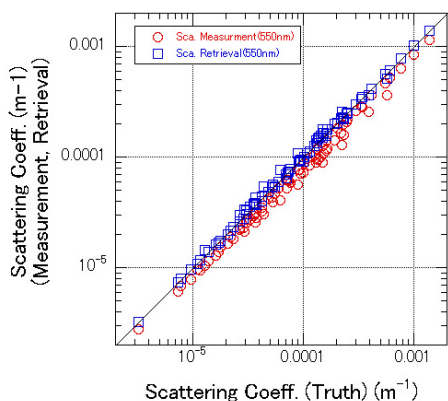


Figure 1

Truth, measured, and retrieved values calculated by the forward model. The measured values are calculated taking account of the light source angular truncation and the non-ideality of the light source.

Scatter plot of scattering coefficient at 550nm. The x-axis represents true data; the y-axis indicates measured values (circles) and retrieved values (squares). The one-to-one line is plotted.

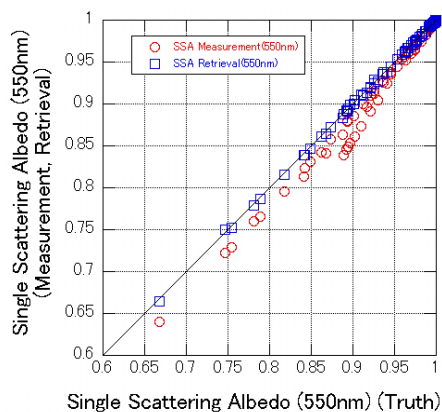


Figure 2

Scatter plot of single scattering albedo (SSA) at 550nm. The x-axis represents truth data; the y-axis indicates measured values (circles) and retrieved values (squares). The measured SSA is calculated using the measured scattering coefficient, which includes the error of the light source angular truncation and the non-ideality of the light source.

- This study developed a method for retrieving the single scattering properties of an aerosol from multiwavelength scattering and absorption data and evaluated its performance and accuracy using simulation data based on Optical Properties of Aerosols and Clouds (OPAC) models.
- Using retrieved values, single scattering properties (scattering, absorption, and extinction coefficients: single scattering albedo (SSA); and the asymmetry factor) are more accurately estimated.
- The RMSE of the SSA calculated directly from the measured values was 0.014–0.021, and that of the SSA calculated from retrieved values was 0.002, corresponding to a relative error of 0.2 %.
- Sensitivity tests of the systematic (bias) error of absorption and scattering coefficients in SSA retrieval demonstrated that, with a 10 % systematic error, the maximum difference between the true value and the retrieved SSA exceeded 0.02 for a small SSA, but with a systematic error of 3 % or 5 %, the maximum difference was small. Therefore, a systematic error of less than 5 % is desirable.
- The retrieved volume size distribution and complex refractive index were qualitatively similar to the original values.