

Review for:

Differences in aerosol absorption Angstrom exponents between correction algorithms for particle soot absorption photometer measured on South African Highveld

By J. Backman et al.

Summary:

Angstrom exponents are a useful tool for assessing the light absorption properties of atmospheric aerosol with respect to brown carbon content and typing (or source) segregation. The PSAP (particle soot absorption photometer) technique is still widely used for this analysis, and numerous correction algorithms exist to account for measurement interferences. This manuscript compares several of these correction schemes, specifically to assess changes in the calculated Angstrom Exponent. The paper is well-written and provides a valuable result to the aerosol community, especially users of PSAP-derived absorption data, and is suitable for publication after addressing the following concerns.

Major:

- 1.) I would recommend that Section 2.2 (Instruments) needs more detail. The wavelengths of the PSAP, MAAP, and nephelometer should be provided for reference. How were the nephelometer measurements interpolated to the PSAP wavelengths, i.e., using a constant scattering Angstrom exponent or the measured values? Was the MAAP measurement also interpolated to PSAP wavelengths? If so, how, given that MAAP is operated at only one wavelength? It would be helpful to include typical dilution ratios in this section (near 9739-21). What was the typical magnitude of the absorption coefficient after dilution, and was this significantly above the detection limit?
- 2.) For the analysis of Transmittance ( $T_r$ ) ranges by comparing PSAP and MAAP data in Figure 3, is there any indication that MAAP transmittance could have biased (or provided more noise to) the analysis? I assume that MAAP and PSAP transmissions did not change synchronously, so can a further analysis be done to only assess data when both instruments are in the same  $T_r$  range?
- 3.) On page 9747, can the authors comment on what happens at Transmission  $\sim 0.45$  to manifest as a local minimum in the data? I do not believe this is discussed in the paper.
- 4.) I suggest being more quantitative in the abstract and conclusion sections. As written, only qualitative descriptions are used to illustrate the results. For example, using 'significant differences' could be bolstered with numeric values.

Minor:

Page-Line

9735-24 spelling change to 'species'

9736-13 'dependency OF light interaction'

- 9736-22 remove the unnecessary sentence: ‘When... (SAE).’
- 9741-18 please fix this sentence, it is not clear.
- 9742-14 are = is
- 9742-25 please define terms in Equation (7)
- 9749-9 chan = can
- Figure 4 I suggest removing the percentile lines to improve the readability of the figure. It is quite busy currently.