

Review of:

“A new approach for measuring the UV-Vis optical properties of ambient aerosols” by Bluvshstein et al.

This paper reports the method to estimate wavelength dependent optical properties (absorption, scattering, extinction, SSA, and refractive index) for aerosols by extrapolate and combined the observed data. The results is interesting and will be useful not only to determine the “effective refractive index” for ambient particles (assuming homogeneous spherical particles), but also the “refractive index” for POA and SOA generated in the laboratory. This manuscript includes sufficient originality, and the topic seems to fit the journal. I recommend publication to AMT after the points below have been addressed.

Major comments:

- 1) I think this proposed procedure to extrapolate the α_{abs} at 404 nm and α_{ext} at 315-345 nm and 390-450 nm to other wavelength is reasonable only when resonant wavelength of light absorption of particles exist at shorter wavelength compared to these measurement wavelengths. However, some types of SOAs are reported to have maximum light absorption at longer wavelengths. I recommend to adding some discussion on this issue.
- 2) Section 2.2.3
How did you calibrate the IN?
How did you estimate the truncation error of the IN?
The truncation error should depend on complex refractive index values.
- 3) Page 7, line 29
“Both $n(\lambda)$ and $k(\lambda)$ were scaled by two incoherent sine waves to simulate temporal variability.”
Could you add some more explanation?
How is the amplitude of sine waves? Is it common method to simulate temporal variability?
If so, pleas add a reference.
- 4) Page 8, line 3
The errors in α_{abs} for the calibration of PAS and the truncation correction for IN seem to be larger than 2%.
- 5) Page 8, line 17
“A complementary N_2 flow of 1.3 SLM was added and mixed with the sample flow, flow, which was then introduced to the IN and subsequently split equally to the SMPS, CPC, PAS, and a three-cavity optical cage that contained the CRD-S and BBCES (see Fig. 4).”
Why did you use the N_2 instead of air?

I think that the difference may influence to the measurements of PAS, IN, CRD-S, and BBCES.

6) Section 3.3 (Ambient aerosol measurement)

Many particles (e.g. black carbon (BC) and coated BC, dust) is not homogeneous sphere in the real atmosphere. Some description on this point may be needed.

7) Fig. 9(c)

The measured and retrieved α_{abs} at 300 nm are more than 10 times larger than α_{abs} at 600 nm throughout the day including the periods when traffic emission seems to have large contributions. Do you think the observed large wavelength dependence (or AAE) is due to the large contributions of brown carbon or inaccuracy of extrapolation of α_{abs} at 404 nm to 600 nm?

8) Supplemental material

The authors assumed negligible light absorption at 637 nm for ambient particles. I think it not common in urban atmosphere because of the existence of BC. I recommend to adding the validation of the assumption.

Minor comments:

1) Page 4, line 1

The value (0.99960) at 330 nm is not consistent with that in Fig.1.

2) Page 5, lines 18-19

“The laser power is continuously monitored and used to cancel variations in acoustic signal related to laser power fluctuations.”

Where the laser power for the PAS is monitored in Fig. 1?

3) Page 7, line 28

I think the “1.856” should be “1.586”.

4) Fig.2(a)

I think that one of α_{ext} in the bottom should be α_{abs} .