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Atmospheric Measurement Techniques Discussions

Interactive comment on "A single-beam photothermal interferometer for in-situ measurements of aerosol light absorption" *by* Bradley Visser et al.

Anonymous Referee #2

Received and published: 4 August 2020

This manuscript introduces an instrument that utilizes a modulated single-beam photothermal interferometer (MSPTI) to measure the aerosol light absorption. The topic of this manuscript is completely relevant to the aim and scope of AMT. The reviewer enjoys reading about the analysis for the phase shift, and strongly recommends the publication. Then, the reviewer thinks that this manuscript is ready for publication and can be accepted for publication in AMT only after some minor revisions are performed. The detailed points for revision in this paper are shown as below;

1. Introduction seems to be a little bit longer than what it ought to be. Is it important in this study to mention the vertical measurement of black carbon? If possible, please

consider shrinking it into around 2 pages.

2. As a matter of fact, one of the important things in the ambient measurement is the durability. Is the future experimental setup able to monitor the aerosol light absorption for longer than 24 hours?

3. The reviewer is wondering if the authors checked the intensity of the laser power would be 50:50 after the beam-splitter. It would be great to leave a comment on the performance of the beam-splitter such as a plot of transmittance vs. wavelength. (Please see the graphs at https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=914)

4. Is it possible for the authors to say the power of laser in the current setup? The reviewer can only imagine it from the last paragraph of RESULT section (It must be less than 400 mW).

5. Line 63: One of the hallmarks of this study is to measure the optical property of light absorbing aerosols in an airborne state. In this sense, the reviewer recommends that the authors append a reference (Lee, 2019) to provide the drawback of any filter-based techniques.

6. Line 238: Please make it sure whether the number of equation is correct or not. Equation 3? Or equation 5?

7. Line 252: Please replace 'below a characteristic value' with 'shorter than a characteristic time'

8. Line 286: Is the absolute filter HEPA-grade?

9. Line 351-356: "PTI is an in situ light absorption $\sim$ and the resultant PTI signal.". This is a general explanation about calibration, thus it is irrelevant to appear in Result section. The reviewer recommends that the sentences be moved to Experimental section, maybe at Line 349.

10. Line 376-380: This paragraph is unclear. Please reword the sentences so that

potential readers may understand what it is.

11. Line 456: The MAC and the filter multiple-scattering enhancement parameter were provided from the user's manual of AE33. Is it possible for the authors to comment on how 13.14 m2/g and 1.57 were derived for the MAC and the multiple scattering parameter, respectively?

References Lee J. Performance Test of MicroAeth® AE51 at Concentrations Lower than 2 μg/m3 in Indoor Laboratory. Applied Sciences. 2019, 9(13), 2766.

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