Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-474-RC1, 2020
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Optical source apportionment and radiative forcing of light-absorbing carbonaceous aerosol at a tropical marine monsoon climate zone: the importance of ship emissions" *by* Qiyuan Wang et al.

Anonymous Referee #1

Received and published: 5 July 2020

General comments

The authors present an experimental study of aerosols collected from Hainan Island, South China. The analysis includes absorption coefficients, mass concentrations of black carbon, organic carbon, inorganic elements, and water-soluble cations and anions. Major findings include the source apportionment of the total absorption coefficient and contribution to radiative forcing. The study shows the importance of considering ship emissions in forcing calculation. Overall, the manuscript presents interesting data and analysis shows merit.

Specific comments

1. This study uses AE-33 and PAX to measure absorption. AE-33 provides the mass of absorbing aerosols as final products. Previous studies have reported the calculation of absorption coefficients from AE-33 mass concentration. However, for the sake of completeness, I would recommend to include those steps in supplementary.

2. This study used a Nafion dryer to reduce the RH of particles collected. These dryers are known to minimize particle concentration during the drying process. Is there any data on the % of particle loss within the dryer?

3. The Nafion dryers were connected to Aethalometers only? Aethalometer data is less susceptible to RH. But the PAX data can be influenced by high RH. Was there a dryer connected to PAX?

4. There was a PM2.5 cyclone for Aethalometer and no cyclone for PAX. I remember the penetration efficiency of PAX reduces drastically after 1 micrometer. So, both instruments were measuring different size-cutoff particles.

5. What is the area of quartz filters used?

6. What is the flow rate of the high-volume sampler?

7. One major shortcoming in this study is the absence of 'lensing effect' while calculating absorption. Studies have shown that the lensing effect can contribute to significant absorption. Since Aethalometer uses a filter tape to collect particles, one can assume the core-shell structure of particles (the reason for lensing effect) gets destroyed. But the absorption from PAX will have contributions from the lensing effect. The slope pf 2.29 in Figure S3 might include the lensing effect. Since the experimental setup used in this study does not measure the absorption of core-shell and core separately, it will be difficult to distinguish the contribution from the lensing effect. I would suggest the authors include this possibility in text.

8. Figure 1a – shows the apportionment of Abs, and the same is repeated as Figure

1b. Removing the repeated portion from 1a would give better visibility to it.

9. Page 2, line 13- Optical properties of LAC is not just related to its source. It also depends on the atmospheric conditions and secondary processing.

10. Page 4, line 3 – Educational and residential areas will have their pollution sources such as vehicles, cooking, etc.

11. Page 5, Paragraph 1 – The whole paragraph is about the analysis of filters collected. It must be specified initially.

12. Page 7, line 4 – Which PMF system was used for the analysis? I guess US EPA PMF 5.0! It needs to be mentioned with a reference.

13. Page 9, line 24 – Error bars on Y-axis needed. Since the X-axis is from filters (12-hour sample) and the Y-axis is the average of the same from AE-33 Abs, the error bars are required to see the spread of data.

14. Page 12, line 1 – The cluster 2 back trajectory doesn't touch the Vietnam cost to influence the biomass burning. Was there a spread towards land for this cluster?

Technical corrections

15. Page 2, line 26 – Don't use 'firstly'. 'First' is fine.

16. Page 4, line 10 – 'As described previously' – It is not described anywhere before.

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