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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Reduction in black carbon light absorption due to multi-pollutant emission control during APEC China 2014" *by* Yuxuan Zhang et al.

Anonymous Referee #1

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The authors measured rBC particles with a single particle soot photometer during APEC, and discussed the effects of multi-pollutant emission reductions on the BC light absorption. The results are interesting, and the science of this work sounds good. However there some potential issues with the data analysis and conclusions. Moreover, the English needs to be further improved. I believe this manuscript can be considered for publication in ACP after minor revision.

Page 2 Lines 17–18: Previous studies have demonstrated that a majority of the freshly emitted BC particles are internally mixed from biomass burning emissions (e.g., www.sciencedirect.com/science/article/pii/S135223101830133X). Thus, this ex-

pression should be revised.

Page 3 Lines 26-27: This sentence is hard to understand. How long is the BC lifetime that the authors considered in this study?

Page 4 Lines 25-27: The ratio of mNR-CM/mrBC was calculated based on several assumptions, e.g, RI, density, and core-shell structure, thus, it is better to add some discussion about uncertainties of this method.

Page 5 Lines 10–14: According to Zhang et al. (2018), the authors also used AE33 measurements during this campaign. It is better to compare the calculated light absorption coefficients (based on Eq. 3) with the AE33 measured values.

Page 5 Lines 17–18: What's the standard used to define the pollution episodes?

Page 6 Lines 5-6: The emission control can reduce the concentrations of NO2 and SO2. That's right, and a lot of APEC publications have demonstrated. However, the authors can not obtain the statement of BC coating materials being affected by emission controls from this, though the authors prove this may be right in the following discussion (Fig. 5).

Page 6 Lines 7-9: It's better to add previous studies in Beijing (e.g, http://iopscience.iop.org/article/10.1088/1748-9326/aa64ea/meta) to explain the importance of photochemical reactions in BC aging process.

Page 6 Lines 7-19: The large reductions in the daytime levels of rBC and coating precursors may be due to the higher boundary layer, which favors diffusion of pollutants. How to evaluate the impacts of meteorological conditions and emission reductions on the rBC coatings?

Page 6 Line 23-24: The similar rBC core size during different periods may be due to the similar emission sources, but the statement of "similar atmospheric processes" is not right. The atmospheric processes not only affect rBC core but also the BC-containing particles. Thus, this statement should be reworked.

Page 6 Lines 28-32: Based on the AMS measurements in Beijing, primary organic aerosol (POA) is also an important species. Therefore, POA may be also an important contributor to BC coatings.

Page 8 Lines 20–21: Here it would be good to know if the reductions are statistically significant.

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