Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-1331-RC2, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Light absorption property and potential source of particulate brown carbon in the Pearl River Delta region of China" *by* Zhujie Li et al.

Anonymous Referee #2

Received and published: 4 February 2019

In this work the authors try to quantify the brown carbon contribution to the atmospheric energy budget with a combination of instruments deployed during a multi-month campaign in the Pearl River Delta region. Using measured aerosol size/composition information together with optical constants derived from the literature and a radiative transfer model, the brown carbon radiative forcing efficiency is estimated for a range of single-scattering albedos. The coordinated effort to combine these measurements is impressive and many of the justifications for calculations are well-supported. However, the uncertainty in AAE_BC is replaced by a calculation in which the number size distribution of the BC core is assumed to be a scaled fraction of the overall number size distribution. Also as pointed out by the other reviewer, this seems to be a questionable

assumption; in addition, the scaling factor is derived as a volume fraction - so if applied, it would be the volume size distribution that should be scaled by this number. Given the large uncertainty in black carbon forcing based on actual size distribution and particle morphology (core-shell or not - e.g., Cappa et al., doi:10.1126/science.1223447, 2012), it's unclear whether the BrC forcing can be satisfactorily constrained, even with this accomplished suite of instruments, without additional information from an SP2 or chemical transport modeling simulations. I believe that there is good data for a paper, but the question to be answered may have to be more restricted in scope. For this reason, I propose that the manuscript not be accepted for publication in its present form, but encourage the authors to resubmit with a different hypothesis.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-1331, 2019.