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Interactive comment on "Source apportionment of black carbon aerosols from light absorption observation and source-oriented modeling: An implication in a coastal city in China" *by* Junjun Deng et al.

Anonymous Referee #4

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As BC aerosols play an important role in climate change and haze pollution, it has been a hot topic to identify, source apportion, and locate their sources. The main methods include observation based receptor modeling, emission inventory, atmospheric transport simulation. This study integrated the observation based modeling and emission inventory based transportation modeling to provide a more comprehensive picture regarding BC sources in a southeast coastal city. It clearly showed advancement comparing to similar studies in this topic and merit publication. Below are some comments that I would like the authors to address to improve its scientific quality.

1. Lines 125 and 131: the authors assumed AAE values for fossil fuel BC and biomass BC (i.e., 1 and 2), which play an important role in Aethalometer model for apportioning BC_ff and BC_bb. Although the authors provided references supporting their chosen values for this parameter, there are more recent studies regarding BC's AAE which show a quite wide range of 0.6-1.3 (Liu et al, ACP 18, 6259-6273, 2018). I would suggest to do an uncertainty and sensitivity analysis to investigate the impact of AAE on their results and provide a range of apportionment results instead of a certain value based on AAE = 1 or 2. Reference: Chao Liu, Chu Eddy Chung, Yan Yin, and Martin Schnaiter, The absorption Ångström exponent of black carbon: from numerical aspects, Atmos. Chem. Phys., 18, 6259–6273, 2018.

2. Line 134: "470nm was selected as near-ultraviolet wavelength" According to light spectrum, 470nm is blue light (450nm-490nm) within the visible light spectrum. Near UV is 300-400nm.

3. Line 140: nïĄĎïĄś is the total occurrences from wind sector ïĄĎïĄś. Did you consider the duration of the occurrence? For example, there were two occurrences that the wind blew from 45 degree. One lasted for 1 sec and the other one lasted for 1 min, during which BC exceeded the threshold criterion. If you use occurrence in equation 5, the CPF is 50%. If you use duration in equation 5, the CFP is 98.4%. Which method do you think makes more sense?

4. Line 143: top 25% concentration was chosen as the threshold criterion. I did not see justification or reference for doing so.

5. Lines 240-241: "BC_bb fraction is lowest at 8am and INCREASE due to the decrease in traffic emission. If this is true, BC_bb should DECREASE when the traffic emission increase. Why at 19:00 rush hour BC_bb fraction reaches the highest instead of lowest, when the traffic emission peaks?

6. Lines 341-342: you see the discrepancy between the observation based results and modeling results and try to explain why modeling underestimate BC_bb in win-

ter. It seems you have subjective preference for observation method over modeling method. As we know both methods have uncertainties and nobody really know what the true FF/BB apportionment is. In winter, Aetholometer method yielded larger BC_bb fraction than modeling method but it doesn't necessarily mean the modeling "underestimate" the BC_bb fraction. Could it be that the Aetholometer method "overestimate", or both overestimate but Aetholometer overestimate more, or both underestimate but Aethlometer underestimate less? I'd like to see more in-depth investigation regarding the discrepancy and an objective, comprehensive discussion of both observation and modeling results, instead of just focusing on the issues of modeling method.

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