

Interactive comment on
**“Observationally-constrained carbonaceous
aerosol source estimates for the Pearl River Delta
area of China” by N. Li et al.**

Anonymous Referee #2

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Understanding carbonaceous aerosol is an important issue. There are still large uncertainties in the components measurements and simulations. In this paper, observation of OC/EC data were used to get a scale factor of model input emission of carbonaceous aerosol. The source contribution to OC, EC, and SOC was then estimated. The idea of the paper is interesting. However, a major revision is required considering the following issues.

Major comments:

1. Though the authors claim they target on seasonal patterns, the simulation design including the simulation time (four 7-day periods) and spin-up time (1 day) is not rea-

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sonable for the study purpose. Firstly: It is too short to use 7 days to represent a season condition, since result could be vary significantly due to the change of synoptic-scale meteorological condition. Secondly: It is too short to use 1 day spin-up for chemical-transport-model simulation, since it could increase the bias of the simulation under a regional accumulation condition, which is frequently linked with higher pollution concentration. Selecting 7-days period is vital problem for all the further model validation compared with the season mean observations.

2. The authors use multiple regression to match the simulated EC contribution from each sector against seasonal mean observations. They need to add more descriptions/references for the validity about this method on this issue. For example, (1) does this method depend on the linear response assumption between the emission and concentration? It may be acceptable for EC, but not for OC, that may be why the model performance with the constrained emission did not show that much improvement. (2) Is it helpful by using the daily data since the sample size will be much larger by using the higher resolution data? (3) the uncertainties related to the multiple regression of EC observations should be discussed.

3. Since there is large uncertainties for the OC and SOC simulation, there is limited meaning for the source apportionment analysis for OC and SOC, especially for urban conditions.

4. Non-transport includes many sources. It is misleading to say that the non-transportation sources are main sources. The larger contribution of several sources together is expected. It only means sum contribution of many other sources are larger than the contribution of transport source. It does not means the transport source is not import.

Minor Comments:

33588 Line15 one km → 1 km

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How to define current best emission?

33594 Line 10: why to combine the 3 rural stations to represent urban site?

33594:15-20: it is more informative to add the reason about the season pattern of OC and EC.

How do the authors calculate the SOC in the model result?

How do the authors carry out the sensitivity simulation for source contribution analysis? For example, how many runs have been carried out?

Figure 4 why is there no emission over eastern half of Hong Kong?

Figure 8 what is the spatial surrogate used for the anthropogenic non-transportation emission?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 33583, 2015.