

WRF-Chem simulations with perturbed emissions are performed to quantify the contribution of residential coal combustion (RCC) to the particulate pollution in Beijing and surrounding region. The model shows good agreement with surface measurements on PM<sub>2.5</sub> and speciated aerosol mass concentrations, which makes the following sensitivity simulations more reliable. The comparison of the RCC from Beijing versus the surrounding region provides a quantitative assessment of the efficiency of the residential coal replacement plans for the policy makers. The paper can be accepted by ACP after my following questions can be addressed.

1. The description of all the sensitivity experiments should be summarized in the Model and Methodology. More details should be provided what species in the emission inventories are turned off in each sensitivity run.
2. Total OA simulation is reported to be consistent with observations. Meanwhile, the authors mentioned the POA and SOA observations are available during the simulation time. It is interesting to know how OOA (representing SOA) is simulated in the model? In other words, is the primary:secondary ratio right for the aerosol sources in the model?
3. L279, was the electricity mainly from coal burning as well? L281, why the coal replacement plan in Beijing is controversial?
4. L333, “bring back the blue sky to Beijing” is a vague statement. What’s the definition of “blue sky”? Better to use some criteria in term of PM level.
5. L340, the conclusion here is somewhat objective. 18% reduction can be considered “significant” as well. Please rephrase the sentence.
6. Is the atmospheric stability or air stagnancy changed by the coal emission as well? Light absorbing aerosols are thought to alter the ambient temperature profile locally [Wang et al., 2013; Zhang et al., 2015; Peng et al., 2016]. Your WRF-Chem simulations with aerosol-meteorology interactions should be able to answer such questions. A related question is what is the TOA radiative forcing from RCC in your simulations?
7. Are the modeled CO spatiotemporal variations well correlated with total PM<sub>2.5</sub> or a part of it like EC? Recently more observational studies use CO as an aerosol proxy to conduct aerosol related researches using the remote sensing technique.
8. Questions on the figures:
  - Figure 2, please thicken the circles in the plot, as they are hardly to see.
  - Figure 4, are they averaged over the 17 days from 9 to 25 January? If yes, I would expect to see a smoother diurnal variation in those plots. The spikes of OA and CCOA near 1800 look very sharp.
  - Figure 8, please specify what each color stands for in the figure caption.
9. Some grammar and English writing issues:

- L16, L316 assess contributions.
- L149, pollution simulations.
- L176, replicates.
- L184, reasonably yields.
- L272, from southwest to northeast. The usage of article is problematic in several places, please pay more attention.
- L292, still debatable.