

## ***Interactive comment on “Contributions of residential coal combustion to the air quality in Beijing-Tianjin-Hebei (BTH), China: A case study” by Xia Li et al.***

### **Anonymous Referee #3**

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The paper by Li et al. quantifies the contributions of residential coal combustion to air quality in BTH in January 2014 to show the importance of controlling residential sources in reducing air pollution in the region. I have following major concerns needed to be addressed before the publication of the paper. 1. The paper lacks description of inputs to the model. For example, emission information is only mentioned in Table 1 with two papers cited. The two papers actually are two different inventories, which one is used. The emissions are annual/month averages. How did the authors do speciation, temporal allocation for different sources? The resolution of the emission is 0.25deg for MIX, how do you re-allocate them to 6km resolution for the model and what are the uncertainties regarding that?

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2. The paper lacks validation of the model performance on meteorological conditions and air pollutants. The meteorological performance was not mentioned at all. For air pollutants, we can see from Figure 2, most sites have large differences between observation and predictions, mostly under-prediction. Figure 2 actually cannot show if the model performance is acceptable. Statistics should be based on those suggested by previous studies (see refs) are needed and comparison with other studies over China is important. Refs:

EPA, U.S.: Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS, EPA454/R-05-002, 2005.

J.W. Boylan, A.G. Russell. PM and light extinction model performance metrics, goals, and criteria for three-dimensional air quality models Atmos Environ, 40 (2006), pp. 4946-4959

Recommendations on statistics and benchmarks to assess photochemical model performance C Emery, Z Liu, AG Russell, MT Odman, G Yarwood, N Kumar Journal of the Air & Waste Management Association 67 (5), 582-598

3. The brute force method and the uncertainties are not mentioned. Due to the non-linear processes of atmospheric processes. Sensitivity methods such as brute force used in this study can tell the importance of the sources but have major flaws in quantifying the source contributions.

4. Not enough credits are given to previous source apportionment studies in China, especially the source-oriented models. See below examples:

<https://doi.org/10.1016/j.envpol.2015.08.037>

Source apportionment of PM<sub>2.5</sub> for 25 Chinese provincial capitals and municipalities using a source-oriented Community Multiscale Air Quality model X Qiao, Q Ying, X Li, H Zhang, J Hu, Y Tang, X Chen Science of the Total Environment 612, 462-471

5. The writing can be improved, please go through more times. Limited examples are

C2

given: a. WRF-Chem is used officially. b. Line 18, 9 to 25 January should a persistent episode c. "the" can be better used. For example, the Beijing-Tianjin-Hebei region, the Yangtze River Delta region. d. The reference method includes first name initial, not sure if ACP requires this now.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-1237>, 2018.