

Dear Editor,

We appreciate the prompt reviews and would like to thank the reviewers for insightful comments and suggestions on our manuscript entitled “Contributions of meteorology and anthropogenic emissions to the trends in winter PM<sub>2.5</sub> in eastern China 2013–2018” (MS No.: acp-2022-304). We have carefully considered all comments and suggestions. Listed below are our point-by-point responses to all comments and suggestions of Referee #3 (Reviewer’s points in black, our responses in blue).

**Anonymous Referee #3**

The authors have generally answered my questions, but before accepting this manuscript, I still have two minor concerns:

1) Following my previous question 5, as the authors mentioned, the PKU-FUEL emission inventory is from 1960 to 2014. Why not include the year 2014 to do the scaling? The MEIC emission inventory is from 2010-2017. Instead of using the 2016 BTH-PRD and YRD-PRD ratios, why not directly use the formulas in Section 2.1 to do the scaling for the year 2017?

**Response:**

Our winter months are defined as December of the current year, and January and February of the following year. Therefore, we used January and February of 2014 in the PKU-FUEL emission inventory, combined with December of 2013 to make the scaling for winter 2013. For winter 2017 MEIC scaling, we needed the MEIC emission inventory for December 2017, and January and February 2018. Since we did not have the 2018 MEIC emission inventory, the 2016 BTH-PRD and YRD-PRD ratios were used to obtain the 2017 and 2018 winter emissions in BTH and YRD.

Thanks to this comment. We have added one statement in the revised manuscript “It should be noted that the winter of a specific year in this study includes December of this year and January and February of the following year.” at the end of Section 2.1 to

clear possible confusion.

2) Following my previous question 7, though the statistical performance is acceptable (but indeed,  $R=0.77$  is not perfect), a significant discrepancy can still be found before October 2014 in Figure R3. Please discuss in the manuscript whether such an error (not only for this year) can influence your conclusion.

**Response:**

In the verification of BTH in 2014, large differences between the retrieved  $PM_{2.5}$  and the observed  $PM_{2.5}$  mainly occurred in July-September (Figure RR1 below, which was Figure R3 in the first-round response and referred to in the comment above). In this study, our focus is on the winter season (December-February). As can be seen from Figure RR2, the retrieved  $PM_{2.5}$  reproduces well the variations and trends in the observed  $PM_{2.5}$  in December 2014, with a correlation coefficient ( $R$ ) of 0.76, and a small normalized mean bias (NMB) of 5.2%, indicating that such an error would have negligible effect on our conclusions. Furthermore, in our original manuscript, we have compared the results derived from observed  $PM_{2.5}$  and retrieved  $PM_{2.5}$  (the first four rows in Table 5). The self-consistent results reconfirm the discrepancy between observed and retrieved  $PM_{2.5}$  does not influence our conclusion.

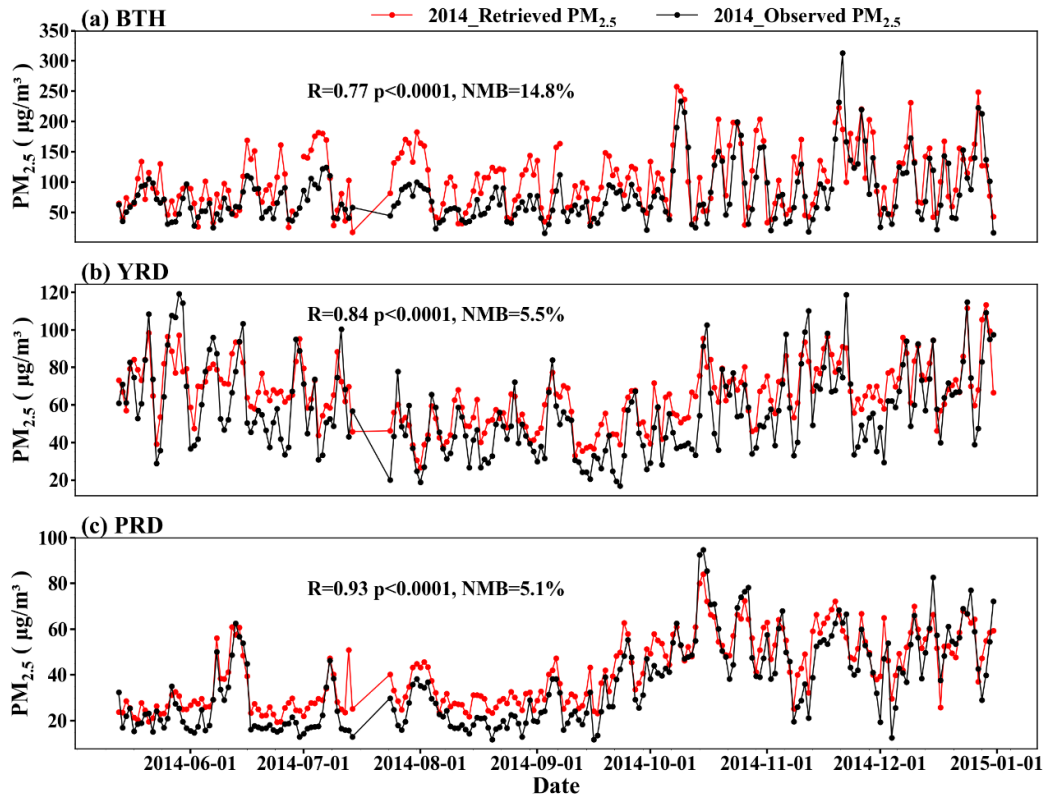


Figure RR1 Temporal variation of retrieved  $PM_{2.5}$  and observed  $PM_{2.5}$  in 2014.

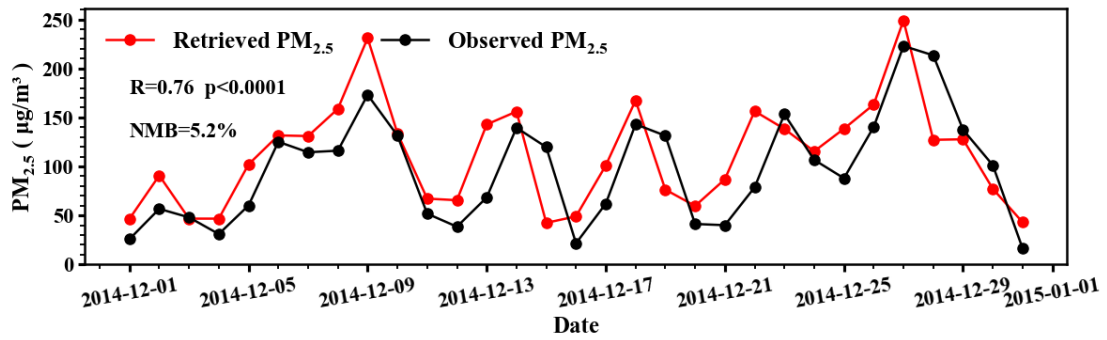


Figure RR2 Temporal variation of retrieved  $PM_{2.5}$  and observed  $PM_{2.5}$  in BTH in December 2014.