

Interactive comment on “Inverse modeling of black carbon emissions over China using ensemble data assimilation” by P. Wang et al.

Anonymous Referee #2

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This study employs an ensemble data assimilation technique to reduce the bias in the black carbon (BC) emission inventory over China. From the point view of methodology, using the ensemble optimal interpolation (EnOI) for emission inversion with low computational cost is an interesting attempt. Significant reduction of bias in BC modeling are obtained after assimilating the surface BC observations, which would be valuable for better knowledge of the bottom-up BC emission inventory over China. Nevertheless, there are several issues need to be addressed before publishing in ACP. Major comments: 1. Because the background error covariance in chemical transport modeling can vary very quickly. In this study, static background error covariance is used in ensemble optimal interpolation (EnOI) to do inverse estimation. How to deal with the rapid variation of background error covariance using the current method? 2. Mete-

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orological simulations and its uncertainty are key impact factor for inverse modeling. This paper seems not pay much attention to this issue. Is the simulated meteorological well consistent with the observations? 3. BC measurements could contain errors and affect the results of inverse estimation. This issue should be considered in their experiments. 4. The uncertainty related to the inverse estimation should be investigated and well discussed. Minor Comments: 1. Figure 7 is not clear and too many graphs are included. 2. The methodology description is too simple and not well constructed. 3. There are some grammatical errors in the manuscript. Help from an English editor is recommended.

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