

Interactive comment on “Secondary organic aerosol enhanced by increasing atmospheric oxidizing capacity in Beijing-Tianjin-Hebei (BTH), China” by Tian Feng et al.

Anonymous Referee #2

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The research presented in the paper aims to quantify the impacts of atmospheric oxidizing capacity (AOC) on the secondary organic aerosols (SOA) as well as ozone in North China. A specific version of WRF-Chem developed by the authors were employed to simulate the role of AOC during a winter severe haze event. I found the results from this work are critically important in understanding and evaluating the Air Pollution Control Action Plan currently being implemented in China. The paper is well organized and written, and the topic is highly relevant with the scope of ACP. Hence, I recommend acceptance of the manuscript after the following minor comments are addressed.

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Discussion paper



- 1) The simulated AOC influence on SOA is convincing, but one question unclear to me is what cause the AOC increase in observations? Is it due to the reduced aerosol concentration and elevated near-surface solar radiation after the pollution control plan?
- 2) The increase in the ratio of OC to EC has significant implication for atmospheric radiation and thermodynamical profiles. It may increase both aerosol scattering and absorption simultaneously. The former is related with near-surface solar radiation as mentioned above, while the latter further regulates the atmospheric stability. If the authors have related model output from the case study, it would interesting to examine those changes in the atmosphere.
- 3) L126-128, good to see a FDDA method is used in the model simulations. Can the authors be specific about what meteorological fields are constrained by what observations?
- 4) L169, why not from 2013 to 2017 like Fig. 3a? Is it due to the data availability?
- 5) Fig. 8&9, the model reasonably well reproduces the temporal evolutions of the major pollutants, both gaseous and particulate. The authors should mention what is the temporal resolution of the emission data used in this study and if it provides the data during the exact same time period.
- 6) L241-242, why do the wind biases cause an underestimation of EC only, not POA?
- 7) Figure 6, why the circles in the map have different sizes?

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