

Interactive comment on
**“Sulfate-nitrate-ammonium aerosols over China:
response to 2000–2015 emission changes of
sulfur dioxide, nitrogen oxides, and ammonia” by
Y. Wang et al.**

Anonymous Referee #3

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This study highlights the growing importance of SNA aerosols in designing air quality mitigation strategies over China. The present study uses a global scale nested grid GEOS-Chem model to study the non-linear response of spatial and seasonal distribution of SNA aerosols to precursor emissions and help address key policy relevance questions pertaining to SNA system over China. The study concludes that the emission control strategies need to focus on NO_x and NH₃ in addition to the current SO₂ emission controls in place. The study emphasizes the need for reducing the large uncertainty prevalent in NH₃ emissions and efforts to develop PM_{2.5} measurement

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network over China.

I recommend the publishing this paper after addressing the following issues:

1. The authors conclude that model prediction accuracy is good based on evaluation with limited observation data and on monthly scale. The authors have used monthly/annual data even at sites where weekly observations were available. It might be better to evaluate the model performance on weekly and monthly data separately
2. In page 24246 line 23 mention about use of satellite –derived proxies like AOD. Have the authors considered using satellite AOD data for model performance evaluation and how the SNA system impacts AOD spatial distribution over China?
3. The study concludes that NH₃ emissions are the primary reason for over prediction despite modeling biases in wet deposition parameters. It would be better to include sensitivity analysis based on deposition parameters to make the above conclusion more convincing.

Specific comments:

1. Include more details on use of potential satellite data for model evaluation in page 24246.
2. In section 2.1 add more details on GEOS-Chem/GOES model
3. In page 24249 what does poor NH₃ conditions mean?
4. Change “Februar” to “February” in page 24250 line 2
5. In page 24251, the authors mention briefly about NO₃ measurement uncertainties. Including this discussion with more details early on in the introduction section will be more insightful to the readers.
6. Better formatting of observations is recommended for clarity in Figure 4
7. In page 24253 line 24, the authors mention availability of bi-weekly observations but

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in introduction they mention weekly scale. Are the observations weekly or bi-weekly scale? Evaluating model with bi-weekly data will strengthen the modeling analysis.

8. In page 24254 lines 7 and 19, the authors need to use caution in describing model performance as accurate as this conclusion is based on evaluating model with limited observation data

9. In page 24256 lines 7-8 the authors mention briefly about impact of high dust loading on SNA distribution. Including more details for dust impact particularly for spring season on SNA distributions will be helpful

10. Include the number of data points used in seasonal statistics calculation in Figure 5.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 24243, 2012.