

## ***Interactive comment on “The unintended consequence of SO<sub>2</sub> and NO<sub>2</sub> regulations over China: increase of ammonia levels and impact on PM<sub>2.5</sub> concentrations” by Mathieu Lachatre et al.***

### **Anonymous Referee #1**

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This paper investigated the reason for the increase of atmospheric concentrations of NH<sub>3</sub> in China. The authors compared model simulations for 2011, 2013 and 2015 to examine inter-annual change of meteorology and reductions in SO<sub>2</sub> and NO<sub>x</sub> emission. The results are useful for PM pollution control in China. Similar topic and conclusions have been shown in at least two recent studies (Fu et al., 2017, Liu et al., 2018). It is important to highlight the difference and new insights in the present work. In addition, the paper requires extensive English editing.

Specific comments:

1. Page 4, Line 6: Meteorology predictions need to be validated before exploring its

C1

impacts on NH<sub>3</sub> concentrations.

2. It's better to put the model validation part (section 3.4 and 3.5) to the first part of section 3, because it's the foundation of the following analysis. Validation of SO<sub>2</sub> and NO<sub>x</sub> predictions need to be added.

3. Page 3, Line 6-7: Why the operationally provided IASI level 2 data cannot be used to analyze the inter-annual NH<sub>3</sub> variability?

4. Page 4: In the EDGAR-HAP-v2.2 inventory you used for 2010, Chinese emissions are derived from the MEIC inventory. The MEIC inventories for 2012, 2014 and 2016 are available in its website (<http://www.meicmodel.org/>). Why not use the MEIC inventory directly for 2013 and 2015? What is difference between your updated emissions for 2013 and 2015 and those in MEIC?

Minor comments:

Page 1, line 4: The full name for "IASI" need to be given.

Page 2, line 5: "NH<sub>3</sub>(g) Chinese emissions " should be "NH<sub>3</sub>(g) emissions in China"

Page 2, line 23: "observed" should be deleted

Page 2, line 25: "ran" should be "conducted"

Page 10, line 2: "reaction" should be deleted.

Page 12, line 16 to Page 13, line 2: The English grammar for the last sentence need to be checked.

Page 16, line 4-7: It's difficult to understand these sentences, and the statement need to be improved.

Page 18: It's difficult to read Table 3. Better presentation and interpretation are needed.

References

C2

Fu, X., Wang, S., Xing, J., Zhang, X., Wang, T., and Hao, J.: Increasing Ammonia Concentrations Reduce the Effectiveness of Particle Pollution Control Achieved via SO<sub>2</sub> and NO<sub>x</sub> Emissions Reduction in East China, *Environmental Science and Technology Letters*, 4, 221–227.

Liu, M., Huang, X., Song, Y., Xu, T., Wang, S., Wu, Z., Hu, M., Zhang, L., Zhang, Q., Pan, Y., and Zhu, T.: Rapid SO<sub>2</sub> emission reductions significantly increase tropospheric ammonia concentrations over the North China Plain, *Atmospheric Chemistry and Physics Discussions*, 2018.

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