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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Non-agricultural ammonia emissions in urban China" *by* Y. H. Chang

**Anonymous Referee #1**

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General Comments:

I have read the manuscript titled "non-agricultural ammonia emissions in urban China". This manuscript presents non-agricultural ammonia emissions in 113 national key cities in China in 2010. The author also analyzed the emission contributions and emission intensities in by sector and city, and estimated the emission ranges based on various emission factors. The author improved previous work by incorporating emissions from pets, infants, smokers, green land, and household products. This manuscript provides a general idea about non-agricultural ammonia emissions in urban area in China. The underlying work will make a contribution to the literature in this regard.

My major concerns about this manuscript are:



(1) The activity levels for different emission sources are not clearly stated and the data sources are not well presented. The standard for a peer reviewed paper is that enough information needs to be supplied such that a research with appropriate background could replicate the work.

(2) There is lack of detail in a number of justifications of assumptions and choices made by the author. Enough information needs to be supplied so that readers can understand the underlying assumptions.

Specific Comments:

(1) Lines 12-13, page 8497, suggest the author also cite others' work to show the importance of ammonia in PM2.5 formation

(2) Line 11, page 8499, specify food production

(3) Lines 13-16, page 8501, need to show references

(4) Lines 18-20, page 8501, the author provided the data source for provincial population of vehicles. What is the data source for vehicle population at city level? Or how did the author use the provincial population to derive city population?

(5) Lines 21-22, page 8501, the author only briefly mentioned that the annual total mileage (for each vehicle type, I guess) were based on Che et al. (2009). But this reference only shows information about annual average vehicle miles traveled (VMT) in Pearl River Delta region based on survey in 2006. Can the annual VMT in this region represent for the all cities studied in this work? Besides, are there any differences of VMT between years 2006 and 2010? Because the author in the later content showed that ammonia emissions from traffic sector made significant contributions, it is important for the author to clarify these assumptions.

(6) Section 2.2.2, Table 1 shows that the waste treatment group includes wastewater, landfill, compost, and incineration. But the author only described the justification if emission factors for wastewater treatment. How did the author pick the emission factors

for other waste treatments? Besides, the author should provide the data sources and assumptions for activity levels.

(7) Line 1, page 8502, specify the investigations and provide supports and preferences

(8) Lines 1-7, page 8502, the author agreed that ammonia emission factors depend on vehicle control technologies, but this work applied emission factors from Roe et al. (2004) which was published 10 years ago and based on vehicle technology composition in the U.S. Do emission factors decrease from 2004 to 2010? Are there any differences of vehicle control technologies in the U.S. and China? It is better to verify this assumption and make it consistent in the manuscript.

(9) Lines 13-15, page 8502, if I understand it correctly, Zheng et al. (2012) (Table 3) and Huang et al. (2012) (Table 4) used 3.20 and 0.003 gmˆ-3 as ammonia emission factors for wastewater treatment. What is the data source of 1.93 gmˆ-3? Why it is mentioned here?

(10) Lines 18-21, page 8502, why the emission from wastewater treatment is compared to agricultural emissions? The author should emphasize the importance in non-agricultural emissions.

(11) Lines 7-8, page 8503, the definitions of resident, registered, and migrant population are not clear

(12) Lines 15-17, page 8503, why the infant population is based on registered population, but emission of human sweat and breathe are based on resident population? If a baby's parents are not registered, can the baby live in the city and contribute to emissions?

(13) Line 25, page, page 8503, it is not clear which population (resident, registered, or migrant? or the latter two? or all?) the author used to calculate the smokers. Are the assumptions the same for all the cities?

(14) Section 2.2.4, the author later showed that ammonia emissions from fuel combus-



tion contribute 27% to the total non-agricultural emissions, but no information about activity levels is provided in this section. The author briefly mentioned that "the current inventory of fuel combustion sources is in accordance with the work done by Zheng et al. (2012)", but very little information could be found in Zheng et al. (2012). The author should provide sufficient details about fuel consumption activities of different sources and their corresponding data sources, so that the estimates can be reproduced by others if possible.

(15) Line 15, page 8504, do you mean 200 kg N of fertilizer per ha per year?

(16) Section 2.2.5, the author made one paragraph description golf grassland, but did not include it in the emission estimates. I suggest the author either delete this paragraph, or make some bold assumptions and provide emission estimates.

(17) Line 15, page 8505, do other cities also have one-dog policy as in Beijing and Shanghai? If not, is the assumption that the situation in these two cities reflects the ownership of pets in other cities valid?

(18) Section 2.2.7, specify household products and provide information about the activity levels.

(19) Line 8, page 8506, what is the data source of the annual agricultural NH3 emissions in China?

(20) Lines 20-23, page 8506, the example of U.S. might not be suitable here.

(21) Line 1, page 8507, it should underestimate non-agricultural emissions in urban area by 15%, but not total non-agricultural emissions, which include both urban and rural.

(22) Lines 2-8, page 8507, the author first claimed that Huang et al. (2012) included waste disposal as non-agricultural sources, but then he/she mentioned that Huang et al. (2012) excluded emissions from waste disposal. This is confusing. Besides, Huang et al. (2012) estimates emission on national level, while this work only discusses

about emissions from cities, the contribution of non-agricultural emissions in these two studies is not comparable.

(23) Line 18, page 8507, this is not clear. Table 1 does not show emission intensity from this work or previous studies.

(24) Lines 19-21, page 8507, why the author introduced the lower and upper limit of ammonia emission intensity from Manchester city center? What is the reference? What does it mean that some cities are out of the limits?

(25) Lines 21-24, page 8507, the references of emissions reported in Beijing, Shanghai, Nanjing, and Guangzhou should be listed in the content.

(26) Line 25, page 8507, which two emission inventories?

(27) Lines 25-26, page 8507, can the author be more specific about the causes of differences between the two inventories (though it is not clear which two)?

(28) Lines 21-24, page 8509, the author should summarize which emission factors are used to make lower, the best, and the upper emission estimates, or modify Table 1 and Table S3.

(29) Lines 1-2, page 8510, how much uncertainty do humans and domestic activity provide? How to make the conclusion that these two categories are important sources of uncertainty?

(30) Line 6-10, page 8510, the logic is confusing

(31) Lines 16-28, page 8510, I feel this section belongs introduction

(32) Line 1, page 8511, does the emission contribution mentioned here include agricultural emissions?

(33) Line 28, page 8511, the author should constrain the statement in urban area.

(34) Lines 6-9, page 8512, it is hard to understand this sentence



Editorial Comments:

(1) In abstract, and discussion, I suggest the author change the unit of emissions from Mg to Gg and reduce the significant figures.

(2) Change the format of references with long links (for example, line 20, page 8501, lines 4-5, page 8502, and Line 17, page 8504). It is better to show them in the reference list, not in the main content.

(3) Line 19, page 8502, “which” or “that” is missing after “one thing”.

(4) Lines 13 and 18, page 8502, make the unit of ammonia emission factors consistent, use either gmˆ-3 or gNH3mˆ-3

(5) References should be provided for Table S3.

(6) Lines 15-16 and 18, page 8503, it is repetitive.

(7) Lines 22-25, page 8503, this is not a sentence

(8) Line 25, page 8503, “smoke” instead of “smoked”

(9) Line 26, page 8503, “consume” instead of “consumed”

(10) Lines 9-12, page 8506, the logic of this sentence is hard to understand

(11) Line 25, page 8506, it is repetitive to use “first” and “initial” at the same time

(12) Line 9-11, page 8509, this is not a complete sentence

(13) Lines 12-14, page 8512, this is not a complete sentence

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 8495, 2014.