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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Quantification and evaluation of atmospheric ammonia emissions with different methods: A case study for the Yangtze River Delta region, China" *by* Yu Zhao et al.

Anonymous Referee #3

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The manuscript develops and presents two gridded NH3 emission inventories, one based on emission factors from the literature and a second with more process information. The two are compared against one other, as well as to two ground sites. CMAQ output was also be compared against satellite columns. This is a good exploration of what is known about NH3 emission patterns in the heavily populated Yangtze River Delta region. That said, without well understanding the methods E1 and E2, it was difficult to fully review manuscript.

Main comment:

Emission inventories with general emission factors or more detailed process have always been used, so at first read I am not sure why this is considered as case study of the methodology versus something like "Quantification and evaluation of atmospheric ammonia emissions for the Yangtze River Delta region, China".

The exact methods used for E1 and E2 are fairly confusing. The "constant emission factors" method that is referenced throughout are actually based on annual emission factors, with a monthly and spatial allocation schemes given on L179-L188. This needs to be clearer early on in the manuscript. Also, to confirm, neither allocation affects the total yearly emission? Are the activity factors different in E1 than what are used in E2?

Sect 2.2.1 about E2: please check each use of 'corrected' to make sure it is clear what/how/why something is being corrected. Specifically, L198 why does the fertilizer use need to be corrected? Where do the relationships in Table S2 come from?

Specific technical/style:

L206 EFbase -> EFbasal and Tbase -> Tbasal

L206-207 Are Tbasal and T0 in different units? Otherwise, 273.15 wouldn't be needed

L213 'method' -> 'application method'? (if I'm guessing correctly). What are the possible methods?

L347-L349 where is this shown about the EFs being from hot seasons?

L518-L519 Please reword. IASI is an instrument, so it cannot 'provide' an averaging kernel

Figure 1 caption: "Studying area and research domain" -> aren't study area and research domain the same?

Figure 3 and Figure 6: 'Januray" -> "January"

Figure 4: emissions misspelled in the y-axis label Figure 4: Suggest giving fertilizer and

livestock consistent colors, then keeping E1 as solid fill but E2 as hatched for easier reading

Figure 6: colorscales could have greater consistency

Figure 9: the subplots should have a consistent axis font size

Figure 10; from caption, shouldn't axis limits be same as Figure 9? Also, helpful to add the border lines like in Figure 9 so one is orientated where they are looking

Figure S4: there is one main cluster of data along the black line, but why is there seem to also be a second one? Also, what is the significance of the red dots, which do not fit well especially for the ABC panel?

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