



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-413-RC1>, 2022  
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## **Comment on egusphere-2022-413**

Anonymous Referee #1

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Referee comment on "NH<sub>3</sub> spatiotemporal variability over Paris, Mexico City, and Toronto, and its link to PM<sub>2.5</sub> during pollution events" by Camille Viatte et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-413-RC1>, 2022

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General comments:

The manuscript of egusphere-2022-413 presented the result of a unique project of the AmmonAQ that targeted different three areas of Paris, Toronto, and Mexico City. Towards better air quality by mitigating NH<sub>3</sub> emissions, the finding of this study will contribute to improving the atmospheric environment. I generally agree with this manuscript being published; however, some points are concerned. Especially, I am wondering about the uncertainty of the satellite NH<sub>3</sub> measurement dataset analyzed in this study. Please address the following specific points.

Specific comments:

P3, L52: Please specify these five countries.

P3, L65: Are these increasing trends explained by the expansion of NH<sub>3</sub> emissions, or meteorological variability (e.g., temperature)?

P3, L77: Does "the standard" indicate the standard in Mexico? Because this study conducted the comparison over three regions, it will be better to explicitly state it.

P5, L111 (Section 2.1): Because of the recent progress in satellite NH<sub>3</sub> measurement, I

would like to strongly suggest including the discussion of the uncertainty of satellite data, such as the detection limit (<https://doi.org/10.5194/acp-19-12261-2019>).

- What is the mottled pattern found over Canada during winter in Figure 3?
- Can all satellite measured  $\text{NH}_3$  close to zero be used in Figure 4?
- Is it available AK when comparing GEOS-Chem? The information on AK and how to calculate it in the comparison with the model is not described.

P5, L115: What is the actual gridded data (e.g., Figure 2) analyzed in this study?

P5, L130: Although we can find the reason to choose the model simulation period of 2011 in P12, L344-P13, L349, it is better to be shortly explained here.

P6, L178: Are these three panels shown with the same horizontal distance? If different, the scaler might be helpful.

P6, L152: Too coarse reanalysis resolution to investigate air mass trajectories on 50 km radius-circle at each city?

P7, L188: Same to Europe and southern North America, source information of "(Canada)" or "(U.S.A.)" can be useful in this Table 1.

P13, L358: Should the denominator be "observations" when comparing observation and model? Why model is referred to as a criterion?

P13, L359: Are these values positive? If model underestimation, are these negative?

P14, L379: From the spatial mapping over Europe, this seems to be simply led to model overestimation, and this is not consistent with the timeseries and relevant discussion in the main text. Please confirm this figure.

P15, L413-418: From this comparison on  $\text{PM}_{2.5}$  component, I am suspicious about the result in other cities of Paris and Mexico City. When we considered this poor performance for  $\text{PM}_{2.5}$  components, the result in Figure 9 and the relevant discussion seems to be meaningless. Is this performance for  $\text{PM}_{2.5}$  component useful (worse or better than other

studies)? If not, I would like to request to reconsider this final section in P14, L391-P16, L425.

Technical corrections:

P10, L281:  $4.71 \times 10^{15}$ ?

P12, L324 and L325: "m.s<sup>-1</sup>"? Does it need the period?