

## ***Interactive comment on “NH<sub>3</sub> emissions from large point sources derived from CrIS and IASI satellite observations” by Enrico Dammers et al.***

**Anonymous Referee #2**

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NH<sub>3</sub> emissions from large industrial and agricultural point sources are very uncertain, and are thought to have a minor contribution to the global total NH<sub>3</sub> emissions. This manuscript has presented a pioneering study using satellite observations of ammonia (NH<sub>3</sub>) gas column concentrations from both CrIS and IASI to estimate the emission rates and lifetimes of NH<sub>3</sub> from the large point sources over the world. The satellite derived NH<sub>3</sub> emission estimates are compared with regional and global inventories, and show that current emission inventories generally miss or underestimate these point sources.

The manuscript is overall well organised and written. I recommend publish after the following comments been addressed.

C1

### **Specific Comments:**

(1) One comment is whether the satellite derived emission estimates can be influenced by the vertical sensitivities of the satellite measurements. For example, the CrIS-NH<sub>3</sub> product is retrieved using the optimal estimation method. A priori profiles and averaging kernels matrices are then often required for comparing with other in-situ measurements. Satellite retrievals tend to have weak sensitivities in the boundary layer, and thus underestimate the true concentrations. Would it impact the results as presented in this study? Please discuss.

(2) Page 1, Line 13 in the abstract:

Please rewrite the sentence “which is equivalent to a factor of 2.5 between the CrIS estimated and HTAPv2 emissions”. A factor of 2.5 compared with what values?

(3) Page 6, Line 9:

“only observations with a Quality Flag of 5”. Please explain the meaning of “Quality Flag of 5” or list the reference.

(4) Page 8, Line 10:

“at a resolution of 0.75x0.75 resolution (40 x 40 km<sup>2</sup>)”, 0.75 degree does not correspond to 40 km. Please check.

(5) Page 9, Line 9:

Please define sigma here in the text. Sigma is also used in Page 8, Line 30 with a different meaning.

(6) Page 10, Line 20:

Please also define lambda in the main text.

C2

(7) Page 17, Figure 6:

For Figure 6, can you please explain why HTAP emission totals are integrated over 1 degree x 0.5 degree, rather than a finer resolution to compare with the point sources?

(8) Page 22, Table 4:

The Region total HTAPv2 value for China is too high due to the region define for China (Figure F1) also covers the main NH<sub>3</sub> emitting areas in the northern India. I suggest add a table footnote to mention it.

(9) Page 29, Appendix B

Can you provide the range of fitted background concentrations (B)? Would high background NH<sub>3</sub> concentrations over regions such as eastern China affect the applicability of the fitting approach to estimate point emissions?

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-453>, 2019.