Review of “Measurement report: Evolution and distribution of NH3 over Mexico City from ground-based and satellite infrared spectroscopic measurements”

Summary

This paper describes a study of the changes in NH3 over Mexico City as observed by FTIR instruments at two ground stations, one in an urban area and one in a more remote location, and from the IASI instrument. The FTIR and IASI data both showed similar seasonal variability, peaking in April and May, and a significant increase in NH3 amounts over the observing period. Interestingly the largest NH3 amounts are measured in the northeastern corner of the MCMA and appear to have local sources, as predicted from an emissions inventory and confirmed by a back trajectory analysis.

The paper is well laid out and clearly written. The plots are very high quality and easily understood. It requires only some minor edits and additions to be acceptable for publication.

Technical comments

Line 132: Please provide a little more detail on the a priori profiles. Are there more than one? If yes, how are they chosen?

Line 279: Could the authors propose some possible explanations for the column underestimation by IASI?

Minor edits

Line 71: come from

Line 74: “The inventory also strongly attributes the NH3 sources to a range of population activities and 75 feces from domesticated animals”. This sentence is not clear.

Line 89: …all of which are classified as …

Line 152: …when the thermal contrast is large

Line 171: Please clarify this sentence: “The 8-hour back-trajectory was selected to capture only air masses traversing the MCMA”.

Line 174: …NH3 is mostly concentrated near the surface
The average NH3 total columns for the entire period (1.46x10^{16} ± 0.64 molecules/cm^2 at UNAM and 1.87x10^{15} ± 2.40 molecules/cm^2 at Altzomoni) are listed and...

attributed to the conversion to ammonium, as was observed by Moya et al. (2004) when describing the evolution of the surface gas phase NH3 and PM NH4+ evolution at an urban site in Mexico City.

the evolution with time...

... in Figure 9a

However, IASI-NH3 shows a consistent negative bias. The evolution with time is represented by the IASI-NH3 and FTIR-NH3 annual averages in Figure 9b.

even in Altzomoni,

... there is an increase of 62 % over a decade for Mexico City, in agreement with the trend....

... at this station

from a variety of local sources and does not show only the transport of NH3-enriched air masses from the enhancement region to the northeast observed in Figures 7a to 7c. This is in agreement with Viatte et al. (2022).

This sentence is not clear or does not follow: this agrees with Figure 8 where the main NH3 sources in MCMA are seen to be urban.