

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

Line 177: The average NH₃ total columns for the entire period ($1.46 \times 10^{16} \pm 0.64$ molecules/cm² at UNAM and $1.87 \times 10^{15} \pm 2.40$ molecules/cm² at Altzomoni) are listed and ...

Line 207: ...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.

Line 314: the evolution with time...

Line 316: ... in Figure 9a

Line 317: 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.

Line 320: even in Altzomoni,

Line 322: ... there is an increase of 62 % over a decade for Mexico City, in agreement with the trend

Line 329: ... at this station

Line 334: 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).

Line 339: 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.