

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-168

Anonymous Referee #2

Referee comment on "On the development of a new prototype PTR-ToF-MS instrument and its application to the detection of atmospheric amines" by Alexander Håland et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-168-RC2>, 2022

This is an interesting manuscript that I believe needs additional information added prior to publication. I find it difficult to understand the full capabilities of this system independently because of a lack of information provided, like detection limits. Without more benchmark stats provided the reader will not be able to effectively compare this instrument performance to others such as the commercial VOCUS running NH_4^+ , a comparison that the authors themselves do not provide. While this work is certainly of use to illustrate the power of this technique to detect amines more information is required to make it of wide use to the community.

In the introduction from around line 51-65 there is a verbal comparison of the HCGD ion source to the VOCUS source. There are several lines here that suggest potential issues with the VOCUS source, that are not supported by data, meant to indicate that these are issues with the VOCUS ion source. It seems inappropriate to criticize the VOCUS for theoretical issues which are not investigated within this work, nor are necessary to understand this manuscript. This seems inappropriate and I believe this section should be removed.

In general, this paper feels like it is lacking in the detail necessary to make it a strong addition to instrumental papers on the NH_4^+ techniques that are being used. Perhaps I missed it on my read throughs, but it doesn't seem like the authors even give details on what ion source fuel was used to generate NH_4^+ , was it a water solution containing NH_3 ? In terms of the ion generation more details on how clean the spectra are with respect to potential primary ions is needed, how effectively do the conditions identified/used reduce the $\text{NH}_3\text{-NH}_4^+$ or $\text{NH}_3\text{-H}_2\text{O}^+$ ions which may lead to alternative products that would complicate the spectra. Showing a spectrum and the relative abundance of these ions would be beneficial. Additionally, for any calibrants that were measured perhaps the authors could give a comprehensive list of where else in the spectra ions were observed. Is there any fragmentation occurring, or unintended products observed. Do you see both adduct and proton transfer products.

Without an actual comparison to a VOCUS ion source it is difficult to understand if this HCGD source coupled to the FIMR TOF is indeed an advantage over the commercially available VOCUS package. Do the authors have any data that can serve as a point of comparison?

It is clear that this instrument functions well, but the package is not commercially available and as far as I understand you cannot purchase a VOCUS with a HCGD, nor are the design plans for the HCGD publicly available to my knowledge, so I am not sure how useful this work is if the instrument is a specialized one-of-a-kind instrument. Am I missing something, and this would in fact be a system that could be reproduced easily or purchased?

There are clearly data gaps in the time series shown in figure 5 which are possibly instrument zeros, it would be helpful to see the zero data in these figures, or at least an inset of data showing the zeroing. The same is desired for figures 7 and 8, where without the zeros it is impossible to determine if these features are driven by changes in instrument backgrounds or real ambient observations.

In line 245 the authors point to the potential interpretation of 1 ppt signal variation on a 1-minute signal. Without knowledge of the instrumental detection limits, which are currently missing from this work it is unclear if you can even interpret that information. It is possible that the 1ppt variations are simply due to unstable instrument conditions. Showing background periods associated with that data and the experimentally determined detection limits during that measurement period is necessary to imply observations are interpretable on that level.

Specific comments:

Line 31, rewrite to read "Because of the presence of an electrostatic field..."

Line 45, ions is are sampled

Line 67, the word exemplary is used here to describe laboratory and field data but it is nonquantitative and should be removed.

