

## Comment on amt-2022-168

Anonymous Referee #1

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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-RC1>, 2022

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This manuscript describes the development of a prototype proton transfer reaction time of flight mass spectrometer and provides examples of applications. The applications focus on the detection of amines under a few different conditions. Amines are challenging compounds to measure, particularly at high time resolution and new measurement techniques capable of high-quality measurements are required. A common theme throughout the manuscript is that it is important to consider multiple aspects of instrument performance, not just instrument response. I agree with this point and thank the authors for clearly stating it since it sometimes gets lost in discussion. As such, this manuscript is of interest to the community and is within the scope of this journal. However, there are several points that require attention before I can recommend the paper for publication.

### Comments:

- For measuring sticky compounds present at low mixing ratios such as amines, instrument and inlet background/zero determination is critically important. In order to properly judge the prototype instrument, further information on both instrument and inlet background are required. For instance, how frequently and for what length of time were zeros performed for the ambient measurements? How reproducible/stable were the backgrounds? Did relative humidity changes influence the background (particularly the inlet background)? Seeing a time series showing both ambient and background data would also support the claims about the short response time and the reduction in memory effects. Although the paper focuses on the instrument and not the inlet per se, information on the inlet background and response is necessary for the reader to critically evaluate the ambient measurements.
- Given that this is an instrument paper, detection limits, precision, and accuracy should be reported.
- The time resolution of the measurements should be more clearly presented particularly for the data presented in figures 5, 7, and 8. Without this information, it is challenging

for the reader to adequately judge instrument performance.

- Several steps were taken to improve response time (increased flow through the flow reactor heated lines, NH<sub>3</sub> addition). If available, I think it would be beneficial to include information on the relative impacts of these different steps. Steps such as heating lines to 100 degrees Celsius can be challenging in certain deployments and NH<sub>3</sub> adds additional complexity (and corrosion concerns). It would be beneficial to the community to understand which practices are the most critical for response time.
- I ask the authors to consider adding examples of ambient mass spectra, particularly around the ions of interest, for the NH<sub>4</sub><sup>+</sup> and H<sub>3</sub>O<sup>+</sup> modes. This would provide justification for the claims about simplifying interpretation.
- Given that the applications described are amine measurements, the introduction should include a brief summary of the various techniques that have been used for amines rather than just focusing on comparisons to the VOCUS. Specific advantages relative to those measurements should also be detailed.
- Please fix the section numbering (there are two section 2.2)