

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-399

Anonymous Referee #2

Referee comment on "MULTICHARME: a modified Chernin-type multi-pass cell designed for IR and THz long-path absorption measurements in the CHARME atmospheric simulation chamber" by Jean Decker et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-399-RC2>, 2022

The authors describe the successful characterisation and quantitative measurement capabilities of a new optical absorption instrument called MULTICHARME installed at the CHARME atmospheric simulation chamber in Dunkirk. The instrument is capable of measuring rovibrational transitions over the range of infrared to THz radiation with path lengths from 120 m to 280 m in the THz and up to 540 m in the IR range. Measurements of N₂O and O₃ are shown, highlighting the potential for the distinction of isotopic composition and kinetic investigation.

Specific comments:

1.: Why was a zero-biased detector chosen for the THz radiation, instead of a typically more sensitive, powered alternative?

2.: On Page 15, Line 370 you describe the loss processes for ozone before your THz measurement begins. However, if the losses occurred already during the ozone injection, the photometer should also have shown a lower value, no? And also, how long is the pumping time to reach the THz measuring pressure, such that it could explain the loss of half of the ozone? Is this consistent with the resulting wall losses in Section 3.2.3?

3.: Can you elaborate on the relatively larger error bars for the ozone detection between ~460 and 600 minutes in Fig. 8b, also with respect to how the LOD for ozone was determined?

4.: P16 L396: Why does the cleanliness of the chamber walls change with different ozone concentrations?

Technical corrections:

Generally: inconsistent use of italics for variables in the text, please correct.

The last sentence of the abstract lacks a word (e.g. [...]as well as possible *uncertainties* induced by the multiple standing waves[...])

P5, L134: a_n_ oscilloscope

P8, L189: [...]measured signal as a function *of* the frequency[...]

P10, L238: a_n_ R^2

P14, L342: replace "to eliminate as much as possible the rapid oscillations" by "to further reduce the rapid oscillations"

P15, L355: re-order: remaining baseline oscillations

L362: Do you mean "at the injection time, the ozone concentration was estimated to[...]"? please clarify. If it was measured by a photometric analyzer, why was it only estimated?

L367: replace "has been targeted" by was chosen for this study (preferably with a reason)

L381: decrease_s_; kinetic_s_

L382: double "due"

P16 L393: _a_ UV-photometric

L397: extra space before comma

L399: extra space behind and; dependencies or dependency, not dependences

P17 L429: there is a red dot after LODs

L430: in, not into