

Atmos. Meas. Tech. Discuss., referee comment RC1  
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## Review on amt-2021-147

Anonymous Referee #1

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Referee comment on "Characterisation of the Manchester Aerosol Chamber facility" by Yunqi Shao et al., Atmos. Meas. Tech. Discuss.,  
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This manuscript focuses on the description and characterization of the MAC chamber. It contains a detailed description of the chamber itself and results from different tests that were performed such as loss rate of trace gases and degassing from the chamber walls, loss rate of particles, etc.

I think the paper is relatively well written and it covers a good amount of testing. One thing is not clear to me though is if the chamber is a new chamber or the improvement of an older chamber or neither. I think it is not a new chamber as there are references of studies done with it since 2012. Therefore I think it would be useful as this paper summarize the chamber itself to also summarize all the studies done within this chamber and in particular it would be interested, if possible, to show together in this paper the results of previous characterizations. One of the message of this study is that the chamber needs to be properly checked routinely during experiments as it is shown that indeed the behavior of the chamber in respect of degassing and losses of gases and particles changes significantly. Therefore I assume there are more tests available that could help track the behavior of the chamber over a longer time. This could be the paper where such information could be included.

If the chamber is new and/or if it consists of a drastic change from the previously used chamber it should be more precisely mentioned as it is not clear as it is described at the moment.

I also think it could be interesting to include within this paper the standardized set of tests that should be performed to properly characterized the chamber before new experiments are carried out.

Specific comments:

Introduction. I feel the first sentence belongs more to the end of the introduction rather than to the beginning.

Page 2, line 34. What does their stands for? I assume organic compounds but it could be specified.

Page 2, line 37. It would be good to have a reference at the end of sentence.

Page 2, line 48. I am sure there are more recent studies out there where chamber studies helped elucidating gas-phase reactions and chemical pathways (see everything that was done on isoprene and Criegee intermediates as two examples...).

Page 3, line 72. I would rephrase "A universal challenge is the presence of walls that can be a sink of the ..."

Page 3, Lines 77 and 78. Although it is true that humidity and temperature cannot be controlled in large outdoor chamber in the same way they can be in smaller indoor chamber, I find the sentence relatively misleading. First, at least for gas-phase mechanisms development, a difference of 20% in water content in a chamber will not affect the reproducibility of a study and the water content can be reproduce better than that. Same goes for temperature which although of course having a larger effect, it is unlikely that two consecutive day of measurement in an outdoor chamber will see striking differences in the temperature in the chamber and experiments can be repeated when the conditions are similar. So, I would recommend taming down the sentence a little bit as to avoid giving the impression outdoor chambers might not give reproducible results.

Figure 1. I found it a bit hard to follow from figure one what was described in the text. I think adding more information (labels) in the figure would help the reader and, if available, I think a real picture of the chamber would help the reader following the discussion of the different parts of the chamber.

Page 6, line 153-154. After the semicolon I think the main verb is missing.

Page 7, line 195. I cannot quite identify which one is the third specific experimental procedure.

Page 8, line 210. Sample instead of sampling.

Page 9, Lines 250-251. I find this sentence not very clear. I would recommend rephrasing it.

Page 10, lines 266-266. Any possible explanation why the RH differed between center of the chamber and at the walls?