Review of the revised version of amt-2020-517

Thank you very much for your consideration of our manuscript (amt-2020-517). We consider the comments from you very constructive and would like to thank you for the fine effort. Accordingly, we have made careful modifications. After taking a look into the house standards of the journal, we have revised the manuscript according to the guidelines. The revised manuscript has been reorganized, proofread by a language professional (Oxford English, as recommended), and marked in blue. The following are our detailed responses to each comment. We hope that the current version of the manuscript is qualified for publication in ***Atmospheric Measurement Techniques.***

#Reviewer 1

General:

1. The English can still be improved, my previous comments on the readability, unfortunately, still hold.

Response: We have carefully gone through the whole manuscript again to avoid grammatical errors. The full text of the manuscript has been checked and modified by a professional native English speaker to improve the readability of the manuscript and avoid misleading sentences. The terminology which was unsuitable for the study has been modified following previously published papers. We hope that the current version of the manuscript is qualified for publication.

2. Please be strict with your use of the word "phenomena/phenomenon"

Response: Thanks for your reminder. We have carefully modified it. Please refer to our revised manuscript for further confirmation.

Abstract:

1. Check the grammar

Response: We have carefully gone through the whole manuscript again to avoid grammatical errors. The full text of the manuscript has been checked and modified by a professional native English speaker to improve the readability of the manuscript and avoid misleading sentences. The terminology which was unsuitable for the study has been modified following previously published papers. We hope that the current version of the manuscript is qualified for publication.

Introduction:

1. Again, check grammar, sentence structures and lengths, and jargon.

Response: We have carefully gone through the whole manuscript again to avoid grammatical errors. The full text of the manuscript has been checked and modified by a professional native English speaker to improve the readability of the manuscript and avoid misleading sentences. The terminology which was unsuitable for the study has been modified following previously published papers. We hope that the current version of the manuscript is qualified for publication.

2. Specify that this study is investigates the effectiveness of noise-reduction algorithms available in the Aethlabs Dashboard. This way, users who do not use this dashboard understand why these algorithms were the ones investigated.

Response: Thank you for your correction. Nowadays, the portable microAeth® MA200 (MA200) is widely applied for measuring black carbon in human exposure characterization and mobile air quality monitoring. However, the field lacks information about this instrument's performance under various

settings. Therefore, it is important to provide this research – an evaluation of the real-time performance of the MA200 in an urban area – for MA200 users. Following this, our research also provides information about post-processing methods to non-users of MA200, which may also have applicability for other instruments.

3. Line 55: "Hagler" not "Hegler"

Response: Thanks for your correction. We have modified it. Please refer to line 81 for further confirmation.

4. The new paragraph (Lines 54-66) is better suited after the paragraph ending in line 105.

Response: Thanks for your correction. We have modified it according to your comment. Please refer to line 79-92 for further confirmation.

5. I suggest this flow for the introduction:
BC definition and importance → BC high spatial variability (disadvantage of fixed stations) → portable instruments = mobile monitoring → introduce MA200 → challenges of MA200 and mobile monitoring (noise) → introduce existing noise reduction algorithm (ONA) and disadvantages → introduce Aethlabs dashboard and offered noise reduction algorithms → objective of the study

Response: Thanks for your suggestion. We have reorganized the introduction section and modified it following your comment. Please refer to the introduction section in our revised manuscript for further confirmation.

6. I am not completely satisfied with the motivation. You mentioned the evaluation of ONA by Hagler (who actually created it) and Van den Bossche 2015 (who, if I'm not mistaken, did not evaluate ONA, merely applied it to their dataset). Between these references you have in the introduction, there is not enough evidence that the ONA did not perform well for mobile measurement datasets. I suggest the paper of Cheng et al., 2013 (10.4209/aaqr.2012.12.0371) although not for mobile applications. But to simplify things, you may motivate your study by stating that a full assessment on noise reduction algorithms for the new microaethalometers used for mobile monitoring haven't been fully assessed yet, etc. You may cite several mobile measurement studies who applied ONA on their datasets, but did not fully evaluate the effects of such data treatment. The telling of this story can still be improved.

Response: Thanks for your suggestion. We have modified it following your comment. Please refer to line 79-92 for further confirmation.

Methodology:

1. I think you don't need to mention the manufacturer again here. You already did in the introduction.

Response: Thanks for your suggestion. We have deleted the information of the manufacturer according to your comment.

2. Strictly speaking, the microaethalometers are absorption (or better, attenuation) photometers. The MA200 particularly only measures "equivalent black carbon" at 1 wavelength (880nm).

Response: Thanks for your suggestion. We have modified and integrated it according to your comment. Please refer to lines 102-103 for further confirmation.

3. Lines 125-132 belong in the introduction. In this part, you can just focus on the instruments' technical information relevant to your study.

Response: Thanks for your suggestion. We have deleted the part that is not relevant to the technical information of the instruments in our study. Please refer to subsection 2.1.1 in our revised manuscript for further confirmation.

4. Line 135 has no relevance to the sentences that follow which are focused on quality assurance of the MA200 in the field. This subsection (2.1) can be rearranged:

A. Technical info of instrument and then quality assurance.

B. Leave out the noise reduction algorithms part and move it to study design subsection because the analysis of these algorithms is the heart of this work.

C. Introduce here that you will only be using absorption/attenuation at one wavelength of the MA200.

Response: Thanks for your constructive suggestion. We have restructured and modified subsection 2.1 according to your comment. Please refer to subsection 2.1 in our revised manuscript for further confirmation.

5. Section 2.3 can be combined with the quality assurance part of Section 2.1.

Response: Thanks for your suggestion. We have combined and modified it according to your comment. Please refer to subsection 2.1 in our revised manuscript for further confirmation.

6. Section 2.4: emphasize that these algorithms are the ones offered in the Aethlabs dashboard

Response: Thanks for your suggestion. We have emphasized and added all algorithms for noise reduction offered in the Aethlabs dashboard. Please refer to section 2.3 (section 2.4 before) in our revised manuscript for further confirmation.

7. Line 206, specify with instrument Hagler used.

Response: Thanks for your suggestion. We have added the relating instruments that Hagler used. Please refer to line 192 for further confirmation.

8. Line 210, I think you mean Fig. S2 here.

Response: Thanks for your correction. We have checked and confirmed that this line described a lower ΔATN threshold of 0.01 for the mobile measurement data, which referred to Figure S3.

Results and discussion

1. I still do not understand the difference of NV (proportion of negative values) and NR (average noise reduction). In the methods, NR is defined as the # of negative values (after noise reduction) / total sample size. How is it different then from NV after noise reduction (which I believe is calculated the same way). And what is "average noise reduction", which part of it is averaged? Averaged over all measurements (1-10)? But then, reading line 349, the 72% and 87.4% is now the average reduction of peak samples? This is very confusing. Based on the caption of Table 2, it seems to me that it is only about the negative values, and not the peak samples. Either separate these two criteria or improve the table caption.

Response: Sorry for the confusion caused, the proportion of negative values (NV) remaining was calculated as the number of negative values divided by the total sample size, however, **the average noise reduction (NR) refers to the reduction of peak samples** and is calculated by the number of peak samples before post-processing (C_i) minus the number of peak samples after post-processing (C_j), and the difference value ($\triangle C=C_i-C_j$) was obtained. Then the change in the number of peak samples was divided by the total number of peak samples before post-processing data. In order to avoid misunderstanding by the readers, we changed **the average noise reduction (NR)** to **the average reduction of peak samples (RP)** in the Table 2 caption. Following this, we have revised this term in the whole manuscript. Please refer to our new Table 2 caption in our revised manuscript for further confirmation.

2. Lines 383-396 are better suited in the methods part when talking about quality assurance.

Response: Thanks for your suggestion. We have modified it according to your comment. Please refer to subsection 2.1, line 107-115, in our revised manuscript for further confirmation.

3. Figure S8, I think (b) is 10-s and (c) is 30s.

Response: Thanks for your correction. We have modified Figure S8 caption following your comment. Please refer to Fig.S8 caption in the supporting information for further confirmation.