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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Quantification of organic carbon sampling artifacts in US non-urban and urban networks" *by* J. C. Chow et al.

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Author's Note: The revised manuscript is attached as supplemental material to this comment

1) TITLE: This referee would strongly suggest / request for the sake of simplicity to call the title: Quantification of sampling artifacts of organic carbon in PM in US networks

We revised the title to: **"Quantification of $PM_{2.5}$ Organic Carbon Sampling Artifacts in U.S. Networks".**

2) ABSTRACT: In his opinion, the abstract does not fully convey the thrust of the conclusions of the work. This passage should be explained in more understandable language. What, I think, is meant is:

1) The field blank of STN is not representative for a real filter exposure because field blank is only exposed for 12 minutes. 2) It should be stated that the areal density of collected PM/carbon is much higher in IMPROVE samples thus reducing the relative contribution of the blanks to a much lower proportion than in the STN sampling. This is due to a higher sampling rate combined with a much lower filter surface area loaded.

A second passage with comments from my side is: The sentence "STN/CSN bQF values are 11–34% lower than linear regression intercepts derived from collocated IMPROVE-STN/CSN data pairs." The non-zero intercept is indicative of a much higher blank in STN, expressed as mass concentration as compared in collocated IMPROVE samples. Again this is highly indicative if not proof that higher face velocities are to be preferred in networks in which only a single filter can be used for daily sampling for OC analysis.

The abstract has been rewritten to convey these concepts more clearly. To address Question 1, Lines 48 – 53 have been revised to read:

A relatively short (1–15 minutes) passive exposure period of STN/CSN and SEARCH bQF OC (0.8–1 μg/cm^2) underestimates positive and negative OC artifacts resulting from passive adsorption or evaporation of semi-volatile organic compounds on quartz-fiber filters. This is supported by low STN/CSN and SEARCH bQF levels and lack of temporal or spatial variability among the sites within the networks.

To address Question 2, Lines 45 – 48 have been revised to read:

A higher IMPROVE sample volume and smaller filter deposit area results in $PM_{2.5}$ areal density (μg/cm^2 on filter) 3–11 times those of STN/CSN and SEARCH samples for the same ambient $PM_{2.5}$ concentrations, thus reducing the relative contribution of sampling artifacts from passive OC adsorption.

3) As for the main text, it seems sometimes a little hard for a European-based audience to locate the various measuring locations and to appreciate the possible implications of

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measuring at those sites for the OC-artifacts. Vice versa, this would apply for data from Europe to be interpreted by US-scientists. Still the fact hat the artifacts might be site dependent makes it more complicated to appreciate the findings in this manuscript. In this respect it is not clear whether the artifacts are higher in the urban or in the non-urban networks. A clear indication is not provided in this manuscript.

A description of the networks and types of sampling sites has been added to the Introduction Section (Lines 101 – 115; see also the response to Anonymous Referee 1). References have been provided for readers who would like to obtain more information about the sampling sites.

Our analysis indicates that, in general, field blanks (bQF) show similar levels between urban and non-urban sites for the IMPROVE network, in the range of 0.7 – 2.5 μg/cm^2 for OC (Fig 4). For the quartz-fiber behind quartz-fiber filters (QBQs), the SEARCH network shows that average OCQBQ was ~25% higher at the urban sites, with 1.51 $\pm$ 1.50 μg/cm^2 at urban sites and 1.18 $\pm$ 0.98 μg/cm^2 at the non-urban sites in the SEARCH network. The increments between the urban and non-urban sites were ~146% for OC1 and 11% for OC2. The majority of this low temperature OC is gaseous VOCs (Lines 426 – 430).

Because different sampling protocols were used in different networks, further research regarding the chemical nature of the artifacts may be needed to understand the variability.

4) As for nomenclature: it is extremely difficult to simplify the issues brought forward in this manuscript. Still the use of abbreviations like btQF is understandable but hardly different at first sight form the abbreviation bQF. This referee, though not very comfortable with the abbreviations for the various types of blanks and acronyms does not have himself a better alternative for these. Still it might be worthwhile to come to an international agreement on describing such blanks in a more definite and acceptable way.

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The abbreviations used in this paper are intended to be intuitively descriptive of the types of blank and are consistent with other authors' earlier publications, including our companion paper (Watson et al., 2009). Fortunately, trip blanks (btQF) are not commonly used, so bQF can be easily distinguished. However, we do agree with Anonymous Referee 2 that a set of well-defined terms for various types of blanks should be developed internationally in the future.

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Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/9/C11493/2010/acpd-9-C11493-2010-supplement.pdf

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