Comments from Referee #2

This study reports on filter measurement data in Beijing, China with the aim of exploring how different sampling configurations and sampling frequency lengths influenced positive and negative artefacts. The results have intended implications for the design of China's $PM_{2.5}$ speciation monitoring network. The topic is relevant to the journal. The paper is not written very well as many parts of the text are confusing and English editing is required. Reviewing this paper was quite difficult as the areas that should have the greatest impact (abstract, implications, conclusions) were very confusing. The overall level of impact of this paper is very minor in my opinion, but the results, if presented better, could be useful for a community that is focused on artefacts in $PM_{2.5}$ filter sampling of carbonaceous constituents, especially for future efforts in China.

Our response: We thank the referee for the remarks which help to increase the quality of this manuscript.

General Comments

(1) Significant English editing is needed to allow for easier reviewing/reading.

Our response: The manuscript has been revised carefully and then polished by Dr. Guenter Engling at the Desert Research Institute. In the revised version, the abstract and conclusions have been completely re-written; and moreover, substantial changes have been made to the introduction (now the background information is introduced more clearly). We think the revised manuscript should be much easier to follow.

Moreover, a diagram and two tables are presented at the end of this response, which are expected to be useful for the referee to review the revised manuscript. The diagram (Figure R1) describes the design of the present study; key observational results and corresponding conclusions are summarized in Table R1; statistical results associated with the major conclusions of this study are presented in Table R2.

Specific Comments

(1) Abstract, second sentence: poorly written and confusing.

Our response: The whole abstract was re-written. The new abstract should be more clear.

(2) Page 3174, Line 24-26: provide a reference for this "commonly believed" idea.

Our response: A representative reference was added as suggested.

(3) Page 3182, Line 12: what is "peri-urban"?

Our response: It should be "suburban" here. This mistake has been corrected.

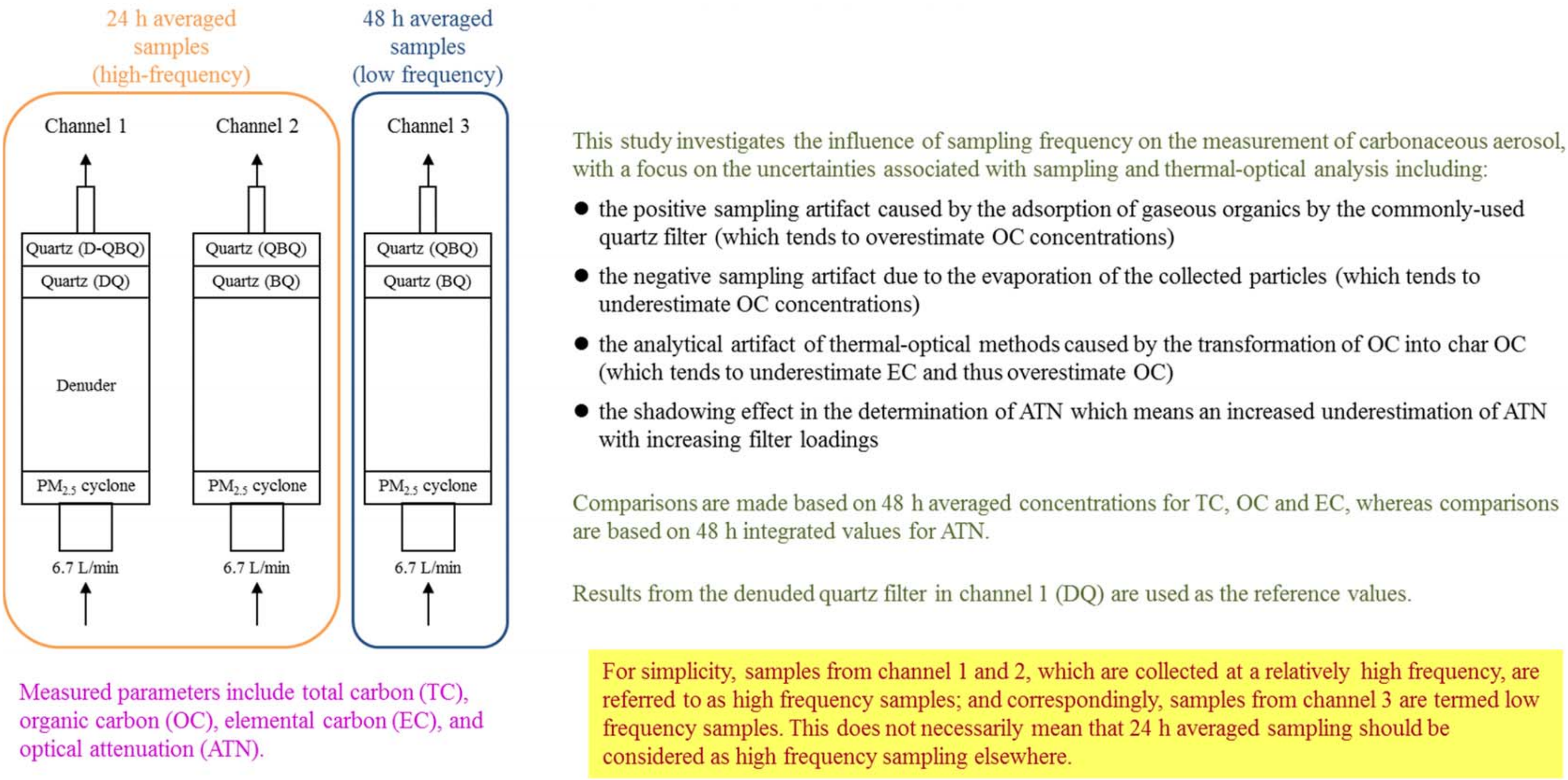

Figure R1. Diagram of the design of this study.

Table R1. Key observational results and corresponding conclusions:

Observational results	Corresponding conclusions
TC measured by the low frequency BQ (in channel 3) could be lower than that measured by the high frequency DQ (in channel 1). This phenomenon is not apparently associated with filter loading, instead, is observed only during a distinct period characterized by high humidity. **(Section 3.1)**	(1) The negative sampling artifact of a bare quartz filter could be remarkably enhanced due to the uptake of water vapor by the filter medium.
EC concentrations of the low frequency BQ (in channel 3) are about 15% lower than results from the high frequency samples (i.e., DQ in channel 1). **(Section 3.2)**	(2) The analytical artifact is more significant for the low frequency samples.
48 h integrated ATN is about 10% lower for the low frequency BQ (in channel 3) compared to the high frequency samples (i.e., DQ in channel 1). **(Section 3.3)**	(3) The shadowing effect in the determination of ATN is more considerable for the low frequency samples.
The EC_R (EC defined by the reflectance charring correction) to EC_T (EC defined by the transmittance charring correction) ratios are much higher for the low frequency BQ (in channel 3) compared to the high frequency samples (i.e., DQ in channel 1). **(Section 3.4)**	(4) EC results of the low frequency samples depend more strongly on the charring correction method.

Table R2. Statistical results for the key comparisons included in this study (2-tailed $p < 0.1$ indicates significant difference at a 95% level of confidence, whereas 2-tailed $p > 0.1$ indicates insignificant difference). Results shown in Table R2 are also presented in the Supplement.

Y	X	2-tailed p	Corresponding conclusions
Low-frequency TC_{BQ} during the high RH period	High-frequency TC_{DQ} during the high RH period	**0.044** (Paired t-test)	(1)
Low-frequency EC_{BQ}	High-frequency EC_{DQ}	**0.000** (Paired t-test)	(2)
Low-frequency ATN_{BQ}	Integrated high-frequency ATN_{DQ}	**0.000** (Paired t-test)	(3)
EC_R to EC_T ratios of the low frequency samples	EC_R to EC_T ratios of the high frequency, denuded samples	**0.005** (Independent t-test)	(4)