

Comments on acp-2021-39

Variability of Black Carbon mass concentration in surface snow at Svalbard by Berto et al.

I appreciate the authors providing me with detailed responses to my previous comments, which help me understand this paper in-depth. I recommend the publication of this manuscript after minor modifications.

We thank the reviewer(s) for appreciating the change we made and for the useful suggestion received during the entire review process improving the overall quality of the paper.

1. The abstract of the paper needs revision.

(a) The statement “Two different snow-sampling strategies were adopted during spring 2014 and 2015 ...” is misleading, as the 3-days of data is not representative of the entire spring season of the year 2015.

(b) Line 32-33: “Precipitation events were the main drivers of the BC variability”, this contradicts with the results stated in lines 503-513.

(c) Line 34-35: “(wind resuspension in specific Arctic areas where coal mines were present)” is not clear.

All the change request from the reviewer have been considered and change made in the abstract.

2. Please include in section-2: How water conductivity was measured/ estimated?

A sentence has been included at line 201

3. Figure-4 caption: “given the remaining covariates”, the sentence is not complete. 95% and 90% confidence interval can be marked in the figure.

Thanks for the comment. The expression “given the remaining covariates” is commonly used in Statistics to mean “conditionally to the remaining covariates” because regression models are defined in way to have a natural “conditional interpretation”. Although the two expressions are equivalent in Statistics, we have replaced “given” with “conditionally to” in order to enhance the readability.

The 95% and 90% confidence intervals are marked in the figure using the segments' thickness: "The segments correspond to 95% confidence intervals about the corresponding estimated coefficients. The ****internal thicker segments**** correspond to 90% confidence intervals”.

4. Table-1: what is intercept in the first row?

The intercept corresponds to the coefficient β_0 that is included in the regression model (see the formula in line 301 of the paper). The intercept term is not of direct interest but it is important for a correct statistical interpretation of the remaining terms of the regression model and it is also necessary for the validity of the R^2 index.

5. Line 493: and additional process > an additional process

We modify accordingly