Atmospheric
Measurement
Techniques

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Discussions

Interactive comment on "Quality controls, bias, and seasonality of CO$_2$ columns in the Boreal Forest with OCO-2, TCCON, and EM27/SUN measurements" *by* Nicole Jacobs et al.

Anonymous Referee #1

Manuscript "Quality controls, bias, and seasonality of CO2 columns in the Boreal Forest with OCO-2, TCCON, and EM27/SUN measurements" from Jacobs et al. and submitted for publication in Atmos. Meas. Tech. covers and important topic, namely atmospheric CO2 observations at high(er) northern latitudes. The authors study to what extent the currently quite strict quality filtering of the OCO-2 XCO2 can be relaxed / modified to obtain more data at high latitudes and what the impact of this is on data quality. They also address related aspects such as bias correction and they make specific proposals on how to improve. The paper is very well written, contains new interesting and important material and is appropriate for Atmos. Meas. Tech. I therefore strongly recommend publication after the minor aspects listed below have

been considered by the authors.

Specific comments:

Abstract, page 2, line 1 following: Concerning the sentence ". . . seasonal variability in biases was observed, and this variability was more pronounced at the TCCON sites than when comparing to EM27/SUN observations in Fairbanks." Is that a robust finding, i.e., does this suggest that EM27/SUN is better than TCCON?

Page 3, line 12 following: Concerning the discussion of the trend in the CO2 seasonal cycle amplitude: Please consider also this recent publication: Yin et al., 2018, Changes in the Response of the Northern Hemisphere Carbon Uptake to Temperature Over the Last Three Decades, https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2018GL077316

Page 5, line 28 following: Concerning the suggested new quality control filters for Boreal Forest regions: Are they limited to this region or can they also be used for the global data?

Captions Fig. 3-5: I recommend to write "flagged bad" (e.g. bad with quotes) or equivalent instead of just "flagged". It would then be easier for the readers to understand (if this is correct) that the figures show the number of rejected observations and not the number of accepted observations. Perhaps one may also extend a bit the main text as the figures may wrongly suggest that there are less good data in summer than in winter although the opposite is probably the case (one may also report the fraction (percentage) of rejected pixels per months; does this number depend on season ?).

Figures 5 and 6: Perhaps add also the relative (percentage) increase for each month (just a recommendation; not mandatory as this info is partially provided in Fig. 7).

Typos etc.:

No typos have been identified.

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