

Referee Report:

Evaluating consistency between total column CO₂ retrievals from OCO-2 and the *in-situ* network over North America: Implications for carbon flux estimation

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1 Overview

In this study, Rastogi et al. reports comparisons of total column CO₂ retrieved from NASA's OCO-2 satellite ($X_{\text{CO}_2}^{\text{ret}}$) and constructed using a high-resolution regional model ($X_{\text{CO}_2}^{\text{sim}}$) over North America. The manuscript is very clear and well presented. This manuscript is well within the scope of ACP. I recommend that the manuscript be published in ACP after minor revision.

2 Minor comments

- (1) Page 5, Line 119: it is described in the text that $\Delta_{\text{CO}_2,i}^{\text{flux}}$ is computed at discrete levels from the surface to 14 km, does this indicate that level $N - 3$ in equation (3), which is the top level used for $\Delta_{\text{CO}_2,i}^{\text{flux}}$, corresponds to 14 km? Please clarify.
- (2) Page 16: 3.4 Evaluating the OCO-2 bias correction: in examination of residual feature biases, the authors state that there is no significant correlations between $\Delta X_{\text{ret},bc-sim}$ and the listed parameters. However, no data is provided. It would be more informative/quantitative to show at least some typical results of the linear regressions.

3 Technical corrections

- (1) Page 3, Line 81: “[ppm]” → “[ppm] (parts per million dry air mole fraction)” (Andrews et al., 2014).
- (2) Page 5, Line 107: if possible, please provide the version of ACOS used in this study.
- (3) Page 9, Line 223: “NOAA’s CarbonTracker-Lagrange”: please provide the version of this model which is used to carry out the simulations in this study.
- (4) Page 11, Line 262: “systemic errors as well errors” → “systemic errors as well as errors”.
- (5) Page 12, Line 279: “a.s.l.” → “a.s.l. (above sea level)”.
- (6) Page 17, Line 333: “ $\Delta\Delta X_{\text{ret},bc-sim}$ ” → “ $\Delta X_{\text{ret},bc-sim}$ ”.

- (7) Page 17, Table 4: the value of C_0 is missing for each season. If the value of C_0 is constant as stated in the text, please fill in this value for each season. Otherwise it may cause confusion to the readers.
- (8) Page 19, Line 376: “upper \$ 350 [h Pa]” → “upper 350 [hPa]”

References

Andrews, A. E., Kofler, J. D., Trudeau, M. E., Williams, J. C., Neff, D. H., Masarie, K. A., Chao, D. Y., Kitzis, D. R., Novelli, P. C., Zhao, C. L., Dlugokencky, E. J., Lang, P. M., Crotwell, M. J., Fischer, M. L., Parker, M. J., Lee, J. T., Baumann, D. D., Desai, A. R., Stanier, C. O., De Wekker, S. F. J., Wolfe, D. E., Munger, J. W., and Tans, P. P.: CO₂, CO, and CH₄ measurements from tall towers in the NOAA Earth System Research Laboratory's Global Greenhouse Gas Reference Network: instrumentation, uncertainty analysis, and recommendations for future high-accuracy greenhouse gas monitoring efforts, *Atmospheric Measurement Techniques*, 7, 647–687, <https://doi.org/10.5194/amt-7-647-2014>, <https://amt.copernicus.org/articles/7/647/2014/>, 2014.