

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-237

Anonymous Referee #2

Referee comment on "Investigation of spaceborne trace gas products over St Petersburg and Yekaterinburg, Russia, by using COllaborative Column Carbon Observing Network (COCCON) observations" by Carlos Alberti et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-237-RC2>, 2021

Alberti et al. compared multiple products of total column measurements of greenhouse gases, including ground- and space-based observations and model simulations, at two high-latitude Russian cities, St. Petersburg and Yekaterinburg. As high-latitude total column observations are sparse, such evaluations are quite useful. The paper is well written, with some structural improvements, it will be suitable for publication at AMT.

General comments:

- Many products are compared. However, it is not clear whether there is a reference. On the one hand, COCCON retrievals were described biased low compared to other products, on the other hand, COCCON retrievals were used to scale the CAMS simulations. Are COCCON retrievals linked to the WMO scales? In a similar way as done for TCCON. With the current version, it gives the readers an impression that various products were compared.
- The scaling of CAMS data based on the COCCON data is a practical way of obtaining more matches. The scaled CAMS data could be called bias corrected CAMS data, instead of upscaled COCCON data. Since COCCON retrievals are obtained by scaling the priors, if the priors would be CAMS, it will be more straightforward to obtain the scaling factor, correct?

Some detailed comments:

L84: in this region instead of on this region

L94: compare already means intercompare/inter-compare, just use compare

L224: please rephrase the sentence. The dry air column from the ECMWF simulations?

L279: were averaging kernels considered in the integrating process?

L290: why is COCCON XCO₂ biased low by about 0.81 – 3.1 ppm? Is the difference indeed caused by a bias in COCCON XCO₂? How is it known?

L417: how many points? It seems that very little data is available at Yekaterinburg.

L432: I wonder whether the linear regressions are significant? What are the R-squared values?

L478: please show some objective ways of assessing the agreement as "close agreement" cannot be judged.