

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-54

Anonymous Referee #2

Referee comment on "Evaluation of MOPITT and TROPOMI carbon monoxide retrievals using AirCore in situ vertical profiles" by Sara Martínez-Alonso et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-54-RC2>, 2022

This is a well written paper with an important additional validation of MOPITT and TROPOMI CO retrievals. The main addition to previous validation studies is that the validation is more robust at higher altitudes due to the better vertical range covered by AirCore. I can recommend the paper for publication in AMT after a few minor changes. These are mainly related to the description of the errors, as detailed below.

Abstract. l. 12, 19 and 20: I find these percentage values difficult to understand as they do not make clear to what they refer (percentage of what?). Further e_{null} (l.20) is not explained and will not mean much to the non-expert reader, certainly in the abstract.

l. 21: please include atmospheric before oxidation

l. 26. include reference for the statement on radiative forcing

l. 37. please include reference.

l. 29/38: at first mention of MOPITT and TROPOMI I suggest to include a reference to an instrumental description paper.

l. 48: this is the first mentioning of AirCore. I suggest including a ref. here.

l. 62: this dimension is specific for the NOAA AirCore and not a general AirCore feature. Other AirCores have different dimensions.

l. 70: the altitude uncertainty is not only determined by diffusion. The flow into the tube and the time to establish a pressure equilibrium in the tube during fast descent is an important factor (see e.g. Wagenhaeuser et al., 2021).

l. 92: again, assumptions on pressure equilibrium during sampling or modelling of the flow into AirCore play a role.

l. 100: latter (not later)

l. 149: what is meant by the true value? Also AirCore has an uncertainty. I suggest to be more careful with the use of the term "true". This applies also to other places in the manuscript where "true" is used.

l. 175: please explain what null-space error is in a way that is understandable for a non-expert reader.

l. 192: The value is certainly not 0.0×10^7 . It is below a certain value. But not 0.

l. 227-234: I'm not sure that this part is really needed. This section should focus on the difference between using truncated and non-truncated AirCore profiles (i.e. what is discussed in lines 235-242).

l. 251: 2.16% of what?