

Interactive comment on “Carbon monoxide total columns from SCIAMACHY 2.3 μm atmospheric reflectance measurements: towards a full-mission data product (2003–2012)” by T. Borsdorff et al.

Anonymous Referee #2

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1 General comments

This paper presents SCIAMACHY CO retrievals using the SICOR algorithm which will be used for the S5/TROPOMI CO data. The full period of SCIAMACHY CO observations (2003-2012) is evaluated and validated. This paper presents a shorter description of the retrieval method (Borsdorff et al., 2014) different from the method used for the first set of data (period 2003-2009) described in the previous literature (de Laat et al, 2010, 2012). To validate the data, the authors used the TCCON and NDACC retrievals and the IAGOS/MOZAIC aircraft insitu data as well. However, before accepting this paper to AMT, I would like the authors clarify several points concerning the study, in C4219

particular in the validation section.

1. For the validation and concerning all the data sets (TCCON, NDACC and MOZAIC/IAGOS): the use of relative differences (in % for example), associated also to the absolute values (bias and standard deviation already presented in the paper) will be appreciated.
2. A discussion concerning the differences between the previous version of SCIAMACHY CO data (version for the period 2003-2009) and this new version is highly necessary to understand the improvements of the new data.
3. Concerning the validation of SCIA CO vs IAGOS/MOZAIC data, this is always difficult to accept that such aircraft data are good enough for the direct validation of satellite data from nadir. Aircraft descents and ascents are not strictly vertical profiles and the derived CO column is difficult to interpret. MOZAIC CO at the surface is representative of airports, with often large CO amounts, and the top of the flight cruise is in the free troposphere far away from the take off location. I understand, averages are made with a condition on the SCIAMACHY retrieval errors to constitute the validation data couple. Some questions should be discussed: are MOZAIC/IAGOS data used in the calculation of the column statically representative of the same area as SCIA? Are the SCIA averaging kernels applied to MOZAIC/IAGOS for the comparison? Why SCIA CO and MOZAIC/IAGOS are almost systematically biased low for most of the airports? I understand the apriori used for the SCIA is a dynamical apriori from TM5 model. Is it an average for the time period (2003-2012)? Please clarify. What are the differences between the apriori and MOZAIC/IAGOS? and the differences between the apriori and SCIA CO at the MOZAIC location? All this questions should be clarified to make sure these aircraft data are well adapted for this validation.
4. Since retrievals (from ground) are used to validate the CO product, why do not use other satellite CO data such as MOPITT (that have the NIR and TIR)?

5. I found the potential data application section too short and I do not see clearly why I should use this data set in the future instead of other product (such as MOPITT or AIRS)? are they more useful for deriving CO sources? In addition, I would like to have clear recommendations on how to use these data, maybe in this section.

2 Minor comments

-Many acronyms are not defined throughout the paper. Please check

-In the introduction, a paragraph on current CO satellite instruments should be written to put into the context these SCIA CO data. This would be appreciated.

-line 307 overall -> overall

-Section 4.2, line 445. The term "is good" is just an appreciation of the authors. This should be more objective by just describing the agreement with statistical parameters obtained. And why line 456, the agreement becomes "fairly good"?

-Conclusion, line 522 and 524 MOSAIC-> MOZAIC

-End of the conclusion, S5P and SCIAMACHY instruments will be different, I am not sure the same retrieval approach alone will ensure the compatibility of the CO data between S5P and SCIA. Please clarify.

-Fig 7 and 10 are very difficult to read, the CO axis (y-axis) is too small and the plot of error bars for both data will be very useful. Please add them.

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