**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Validation of six years of SCIAMACHY carbon monoxide observations using MOZAIC CO profile measurements" *by* A. T. J. de Laat et al.

Anonymous Referee #1

Received and published: 5 April 2012

The manuscript "Validation of six years of SCIAMACHY carbon monoxide observations using MOZAIC CO profile measurements" of de Laat et al., submitted for publication in Atmos. Meas. Tech., covers an interesting topic appropriate for Atmos. Meas. Tech. The manuscript contains new information not published before and is well written. I therefore recommend its publication in Atmos. Meas. Tech. after the comments given below have been considered by the authors.

General:

The authors are probably aware that several SCIAMACHY CO retrieval algorithms exist and that these algorithms, resulting data sets and other results such as validation re-

sults, have been published in the peer-reviewed literature. However, they are not cited by the authors. These publications need to be cited. Furthermore, a discussion needs to be added to what extent the findings of de Laat et al. are consistent (or not) with the findings using other retrieval algorithms including other validation results as published in the peer-reviewed literature.

Specific:

Page 1988, lines 16-17: I do not agree with the statement that weighting with instrument-noise is required (!) for averaging. For example, in case of (undetected) cloud contamination, the noise-error may be small (due to high cloud reflectivity) but the systematic CO column retrieval error may be high (as SCIAMACHY cannot see through clouds). In case of significant cloud contamination, the average CO column will be biased and this bias will be larger if those contaminated measurements contribute to the average with a large weight. I am not saying that one should not do what de Laat is doing but clearly it is not required to do that. Please adjust that statement.

Page 1988, line 21: Please add if the mentioned precision of $1 \times 10e17$ molecules/cm2 refers to single observations or to averages (and if the latter is the case, what spatio-temporal averaging interval is relevant).

Page 1989, line 24: Something is wrong here. At least one number is missing between Huijn and 2 deg.

Page 1992, line 1: I wonder how reliable such synthetic test are, taking into account the SCIAMACHY detector degradation issues in the CO spectral region.

Page 1992, lines 4-5: Is it really meaningful to perform comparisons of satellite averages in areas as large as 800 km with esentially local point measurements (at or near airports) ? Please add at least a few sentences why this has been used as a starting point for the analysis (more specifically: what are the results of de Laat et al. (2010) that suggest this approach) ?

Page 2004, Caption Table 2: Typo: "of" needs to be replaced by "or".

Page 2010, Figure 4: I find this figure a bit misleading. Of course the agreement gets better if those data points are removed where the differences are large. The first impression looking at that Figure is that the agreement is good because the black points get most of the attention. These are however only the "good ones" as the "outliers" have all been removed without giving a good reason why they can/should be removed (apart from the fact that they disagree).

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