Atmos. Chem. Phys. Discuss., 15, C9933–C9935, 2015
www.atmos-chem-phys-discuss.net/15/C9933/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Carbon monoxide climatology derived from the trajectory mapping of global MOZAIC-IAGOS data" *by* M. Osman et al.

Anonymous Referee #2

Received and published: 30 November 2015

General Comments

The paper of Osman et al. presents a global, height-resolved climatology of tropospheric carbon monoxide (CO) from MOZAIC-IAGOS data. A trajectory mapping approach was used to inter- and extrapolate the aircraft data to a regular spatial grid. Several evaluation and validation efforts of the new climatology are presented. This includes detailed comparisons with MOPITT satellite measurements. Furthermore, horizontal and vertical distributions and trends of the CO distributions from the climatology as well as correlations with ozone distributions are discussed.

I found that the paper is well written and interesting to read. It fits in the scope of ACP. Most of the analyses presented here appear to be scientifically sound. The new data set will be of interest for atmospheric modellers looking for CO data sets to initialize

and validate their simulations. It will be also helpful to retrieval scientists that could use it as a priori information and for regularization of the retrievals. My main concern is that the paper is very long. In the revision I would suggest to try to shorten and condense the information as much as possible. Specific comments and technical corrections for the author's consideration are given below.

Specific Comments

p29874, l8-p29875, l2: Such detailed background information on CO photochemistry might not be needed in this observational paper.

p29876, l8-10: It seems your climatology is in fact four-dimensional, taking the time domain into account?

p29878, l7: Does the 5% calibration error count as "accuracy" rather than "precision" error of the measurements?

p29878, l23: Is there a general reference for MOPITT?

p29881, l11-12: How large are the typical vertical errors of your trajectory calculations?

p29881, l24-25: Is there a smooth transition of the correlation length between the troposphere and stratosphere?

p29882, l16: Vectors (x, x_a,...) should appear in bold face, I think. You might add an additional term (+ G eps) in Eq. (2) to remind the reader that retrieval is also influenced by measurement errors (e.g., retrieval noise).

p29883, l9-10: How large are the areas of the averaging kernels? Are they close to one? Another interesting quantity would be the FWHM of the averaging kernels, providing a measure of the vertical resolution of the retrievals.

p29891, l2-23: This text might better fit into the method/theory section (Sect. 2.4)?

p29892, l1-5: Vectors should be printed in bold face, I think.

p29902, l14-15: I would also expect that the trajectory approach performs better than linear/quadratic interpolation, but this was not shown the paper.

p29904, l4-9: Perhaps mention (once more) how the climatology data can be accessed?

Figures: Some figures (e.g., Fig. 2, 3, 15) have very small font sizes and low quality and resolution, making it difficult to read labels.

Technical Corrections

p29879, l12: "southward local equator" -> "southward equator" (?)

p29880, l7: remove brackets around url

p29886, l22: reveals _that_

p29886, l24: _an_ increasing number

p29888, l19-20: reword "a very few" (?)

p29890, l19: remove "also"

p29890, l19: except _for a_ few

p29892, l13: which _is_ not

p29892, l21: African -> Africa

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 29871, 2015.