

Interactive comment on “Current status of the ability of the GEMS/MACC models to reproduce the tropospheric CO vertical distribution as measured by MOZAIC” by N. Elguindi et al.

Anonymous Referee #1

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This paper presents an evaluation of carbon monoxide in several models using the MOZAIC data collected from commercial aircraft. A nice summary of the MOZAIC data is shown for profiles over several cities, with seasonal and inter-annual variations shown. Analysis of several case studies where MOZAIC measurements captured biomass burning events are used to compare different biomass burning emissions, and to the fire emissions injection height.

While there are many nice elements to this paper, I have several major concerns about its final publication.

First, I do not think GMD is an appropriate journal for this paper. It seems to me that

C67

it is primarily an analysis of CO distributions in the troposphere, which is interesting, and I think includes some new material. But this analysis is far more appropriate to a journal like ACP.

Secondly, even if this were submitted to ACP instead of GMD, the description of the models is insufficient and confusing. In section 2.2, MOZART-v1 and MOZART-V10 are referred to. The published and publicly released versions of MOZART are -2, -3 and -4, so I wonder what -V1 and -V10 are?

Finally, the assimilation scheme needs to be described fully. At the end of Section 5.2 it is revealed that the averaging kernels of the MOPITT CO retrievals are not used in the assimilation. While this may be an appropriate first step in developing chemical forecasts, it is not really adequate for scientific analyses. A reference for the assimilation is given, but it is to an ECMWF technical report that I do not know how to access. The version of the MOPITT CO retrievals (V3 or V4?) needs to be given. If the V3 retrievals are used, and the retrieval averaging kernels and a priori are not taken into consideration, the assimilation could be significantly biased to the a priori profile, which may not be realistic in many locations. There have been many publications on the proper use and interpretation of the MOPITT CO retrievals from the MOPITT Team. I recommend either improving the assimilation scheme and re-doing this analysis, or leave the ASSIM model results out of this paper.

Minor Comments & Technical Corrections:

p. 398 The first paragraph is included at the end of the second paragraph.

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C68