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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source attribution using FLEXPART and carbon monoxide emission inventories: SOFT-IO version 1.0" *by* Bastien Sauvage et al.

Anonymous Referee #1

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Review of "Source attribution using FLEXPART and 1 carbon monoxide emission inventories: SOFT-IO version 1.0" by Sauvage et al.

The paper documents the methodology and results from the use of FLEXPART on the IAGOS dataset, with the goal of providing potential users with source attribution. The paper is well-written and provide a good description of the methodology. The application portion of the paper is more limited, focusing on a few examples and broad measures. Overall, I find the paper worthy of publication after consideration of the following points.

Major point

While there is a wealth of information provided by all the parcels released along the flight track, the authors do not provide any information on the standard deviation (or any other statistical information) of the simulation perturbation. In particular, this seems to be of relevance to the discussion of Figure 11.

Minor points

- Line 162: It is not clear the vertical resolution is the most critical factor. Plenty of processes (as discussed in the paper) are not present in trajectories, or a choice of different parameters, could also be responsible for trajectory shortcomings.

- Line 208: Why the ICARTT dataset? There are plenty of regional dataset that might have been of higher relevance than this one. It would be good to justify this choice

- Line 220: it seems that the CO lifetime is not part of this equation. This would be a serious issue since 20-day trajectories are considered. If used, what is the CO lifetime?

- Line 228: it is also important to recognize the CO tends to be mostly released during smoldering and so might not be as prevalent in pyrocumuli.

- Line 286: it is not clear that it is always a straight linear decay with altitude.Âă How important is the definition of the background?

- Line 295: is there any assurance that the background from VP is consistent with UT where they connect? If not, is this an issue?

- Line 301: change "to consider" to "to be considered"

- Line 366: it would be nice to show PV along the same track

- Line 425: Figure needs an explanation of the color bar labels.

- Line 465: change "less good" to "worse"

- Line 471: I think it would be quite illuminating to present an additional figure (within the text or in the supplement) with percentages instead of concentrations.

- Line 488: this might look quite different with percentages!

- Line 497: this seems like a very narrow explanation.Âă There are many things that could go wrong, not just pyro-cumulus.

- Line 502: I think “sense” is better than “information”

- Line 508: this seems like too many plots since very little discussion is attached to them

- Line 513: as mentioned in my major point above, the question is but what is the range of the variability from the different parcels?Âă The only thing that this is showing is that the mean is within the observed standard deviation.

- Line 549: it is hard to get a sense of the change from the Taylor diagrams. If the authors want to keep them, it might be quite helpful to have arrows indicating the direction of the change.

- Line 555: this is actually incorrect. The anthropogenic emissions in MACCity originated from Lamarque et al. (ACP, 2010), except for the added seasonal cycle. Emissions were harmonized for year 2000 with the various scenarios (RCPs); therefore, any data post-2000 is actually the result of the scenario RCP8.5. The fact that they are fairly close is that they share many aspects (see paper above for more details).

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