

Interactive comment on “Comparison of global 3-D aviation emissions datasets” by S. C. Olsen et al.

Anonymous Referee #2

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In the discussion paper presented by Olson et al. a comparison of different global aviation emission inventories is provided. The discussion paper is well written with covering a representative number of global aviation inventories. The paper uses adequate measures and quantities for the systematic intercomparison, however could be more detailed in terms of conclusions.

The paper is relevant as estimates of global aviation climate impact rely on such emission inventories. Atmospheric chemistry models require aviation emission as input values, in order to integrate a realistic representation of the impact of aviation on atmospheric chemistry and climate. The paper presented addresses this highly relevant scientific topic, by presenting, discussing and comparing individual dataset of aviation emissions in a systematic way.

Conclusion section should be more complete on intercomparison of regional and ver-

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tical distributions, where differences are obvious from the results section, as both characteristics are important elements for application in global atmospheric modelling. The described objective in the introduction to provide a footing for expanding these data sets to the past and to the future, should be addressed in more detail. Are all inventories in all species suited for being used in atmospheric modelling, or are there particular limitations? Clear statements should be provided based on intercomparison presented, and highlight differences found.

The abstract provides a concise summary, however could be more complete on conclusions. Results from regional comparisons should be included, and not only on vertical distribution. Title, english language, units used, and references to related work are adequate.

Figures and table in general are clear, however individual improvements are highly recommended. For regional intercomparison figures an alternative representation is suggested, in order to allow the reader to better distinguish between individual inventories. E.g. figure 3 should be presented in an alternative format (left-right instead of top-bottom) in order to better show spread of individual distributions.

More variability between the datasets for CO and HC emissions are presented (Figure 8, 9). A more uniform axis range is suggested to better present regional differences. In the text the authors refer to the uncertainty involved in their calculation in order to provide an explanation. Here they should be more explicit and specify related uncertainty.

The authors present an interesting analysis of temporal resolution of aviation emission inventories. Graphical representation of this diurnal aviation fuel burn analysis is suggested to be improved (Figure 11). Identical x-axis is suggested, and clearer distinction between both "time" axis is suggested.

The authors highlight implications of presented differences between inventories for aerosol and cloud contrail interaction (page 16896). Here also reference to non-linear photochemical processes should be given. Similarly, here numerical diffusion of coarse

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model resolution becomes important. Photochemistry is one of the relevant processes beside aerosol and cloud interaction, when studying aviation emissions atmospheric and climate impact.

I would recommend this paper for publication after the conclusion section has been expanded and the following minor revisions being performed:

Page 16887, Line 10 lighting -> lightning

Page 16887, Line 23 reference Kohler missing

Page 16892 Reference to emission data set as published and distributed should be provided. If presented data differs from those values, e.g. due to scaling of totals, this should be indicated with short comment.

Page 16894, Line 13: Sentence is not clear. Why is given reference to table 1 which does not list neither CO₂, HO₂, SO₂.

Page 16894, Line 17 Numbers indicated are rounded vs table, different numbers of significant digits are used. Same number of digits should be used for consistency.

Page 16899, Line 22: Add "LT" for 22:00-6:00

Page 16901, Line 4: "Aviation emission generally increases" = was not shown, but fuel burn increase.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 16885, 2012.