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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A multi-model analysis of vertical ozone profiles" *by* J. E. Jonson et al.

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Comments to referee 2

Major comment 1

Figures with more sites (similar to Figure 2 - 5 in the ACPD paper) are provided in the supplement. New figures cover sites as Tateno, Taipei, Payern, Hehenpeissenberg Huntsville etc. The number of new figures is restricted to sites where there are a significant number of measurements available, and where the figure will convey significant new information. The effects of intercontinental transport in the free troposphere decrease with distance from the windward side of the continent (as already demonstrated for Goose Bay versus Trinidad Head), but far less than at the surface.

Major comment 2

A new Figure showing the vertical SR relationships for the four regions has been made (and is included in the reply). It does show substantial differences between the four source regions in the vertical distribution of the source receptor relationships. We still think that the Figures 12 -15 conveys valuable information on the differences in source receptor relationships between the individual models not shown elsewhere in the paper.

Major comment 3

We agree that it would have been better to show transport events for episodes that coincide with sonde measurements. However, outside the late autumn/winter months, when ozone sondes are frequently launched to study the ozone layer, sonde measurements are infrequent, and we were not able to find consistent examples of fresh intercontinental transport events in the model data and sonde measurements for the other sites either.

Major comment 4

We have replaced Table 2 with figures already shown in the supplement. The winter months now include also December.

Major comment 5

We will go through the manuscript to check for, and remove repetitions.

Minor comments (some minor comments will be dealt with, but without being specifically mentioned below).

Page 26102 L4-6 and L16-18 The uncertainty estimate in lines 4-6 has been removed from the text.

Page 26104 The text is shortened here. A new figure, as requested by the reviewer in major comment 3, is included here along with text describing the figure.

Pages26106 - 26109 The submitted pdf (and LaTeX) manuscript to ACPD had paragraphs more or less where suggested by reviewer 2.

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Page 26109 As reviewer 2 suggests, the most probable reason for the models not being able to capture the low ozone content in the tropics is problems with deep convection. It could also be related to deficiencies in the monsoon circulation (at least if the effect is seasonally varying).

Page 26109 - 26113 Fig 8 - 11 The figures in the submitted pdf manuscript to ACPD covered two pages, and as a result were larger. We think the ACP format will enable the publisher to enlarge the figures closer to their original size.

The EMEP model was chosen because not all the daily output was available from other models.

We have edited inn a symbol indicating the sonde locations in the e and d Figure panels.

We have included an additional figure showing the vertical profile for the age spectrum of the CO emission for Goose Bay, Uccle, Trinidad Head and Yakutsk. This figure needs further refinements, and is not included in the reply.

Page 26110 L 13 - 15 The reviewer is right. The effect at the surface is about 2 ppb (as also shown in Figure 8b). The influence on the column is large, but judging from Figure 8b, and the new figure described above, mostly caused by a plume in the lower troposphere.

Page 26111 - 26112 This figure is replaced with a figure showing the footprint emission sensitivity figure from the upper troposphere.

Page 26113 There is not so much influence from Europe to Yakutsk, irrespective of height, and the pathway for the lowest layer is very similar to the layer with maximum CO source contributions from Europe. We have however replaced this figure with the footprint emission sensitivity at around 3km altitude.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 26095, 2009.

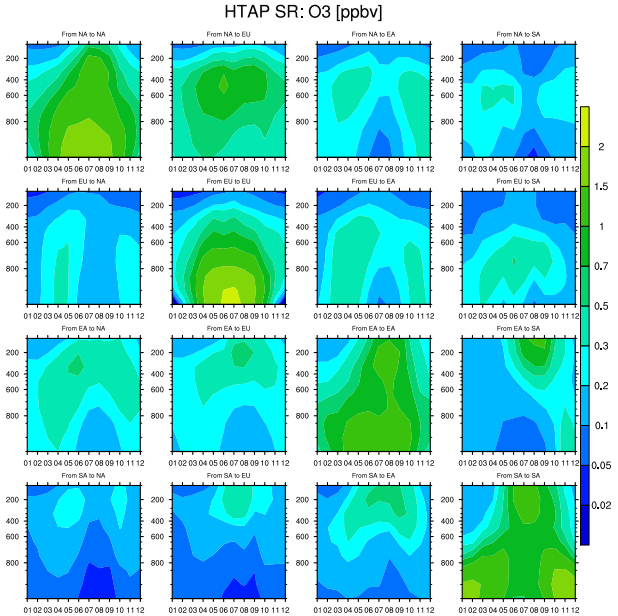

Fig. 1.

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Interactive Comment