Atmos. Chem. Phys. Discuss., 8, S10887–S10889, 2009
www.atmos-chem-phys-discuss.net/8/S10887/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comparison of CMAM simulations of carbon monoxide (CO), nitrous oxide (N_2O), and methane (CH_4) with observations from Odin/SMR, ACE-FTS, and Aura/MLS" *by* J. J. Jin et al.

J. J. Jin et al.

Received and published: 4 February 2009

Reply to Dr. A. Dudhia:

—– We thank Dr. Dudhia for the suggestions. We revised the paper following some of them but we disagree with others. Here is our reply.

Some omissions that come to mind: Why no correlation plots of different molecules? A scatter plot of CH4 v N2O or CH4 v CO would be a good way to reduce dynamical and sampling effects from the comparisons and highlight any particular instrumental discrepancies.

—– We agree that correlation plots are useful for comparisons especially when focusing on chemistry instead of dynamics. However, they use two species and thus cannot distinguish the deficiency of a particular species. Moreover, we intend to show the climatological distributions of these species from the measurements and the climate model and their difference. Obviously, the correlations are not the best tools for this purpose.

Eg if CH4 is the major source of CO in the stratosphere I would expect [CH4]+[CO] to be conserved. Difficult to tell from the plots whether this is actually the case.

—– CH4 is the major source of CO in the stratosphere. However, CO reacts with OH producing CO2 in the stratosphere. Unlike H2O, CO is not the final species of the oxidization of CH4, therefore, [CH4]+[CO] is not conserved either in the model or in the real atmosphere.

Why no comparison of H2O? It is generally well-measured by satellite instruments and, since most stratospheric H2O also originates from CH4, the approximately relation 2[CH4] + [H2O] = constant is another useful constraint on what is plausible.

—– We agree with that H2O and 2CH4+H2O are useful for model evaluation. However, this paper is already quite long, so we do not wish to include more datasets and discussion. A comparison of H2O is being conducted in a separate study.

Why no MIPAS data? N2O and CH4 products (and H2O) from 2002-2004 are public and considered validated, and the CH4 would provide the missing global measurements for comparison with CMAM.

—– MIPAS data would be useful, but the paper is already quite long and so we do not wish to include more datasets and discussion.

Other minor comments: p13071 last paragraph: since both SMR and MLS are limited to latitudes lower than 82.5 whereas CMAM presumably extends to the poles, for comparison purposes it would be better to limit the CMAM measurements averaged

ACPD

8, S10887–S10889, 2009

for the "60-90" degree bins to just the range "60-82.5". Not clear if this was done or not. (If not, might this explain features such as the larger CO maximum at the S Pole - p13074,lines 5-10?)

—– In the revised paper, we only show the ratios of monthly mean profiles at certain latitudes instead of latitude bands (the figures have been modified), so the difference in the latitude ranges of observations and model results does not affect the ratios.

p13071 last paragraph - you mention the use of quality flags for the SMR data but no mention of those associated with MLS - presumably you also used those?

—– Yes, we also used the flags set by the MLS team to process the data. Since these statements about the SMR data are not essential, however, we removed this part.

Table 1: entry for Nov 2003 shows "30-" ? is the dash superfluous?

—– We removed the "-".

Figure 1 seems to have come out smaller than the others - too small to see anything much.

—– It was compressed in the ACPD print format, but it is clear in the normal ACP page. In addition, half of the panels are removed in this revised version.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 13063, 2008.