Atmos. Chem. Phys. Discuss., 7, S208–S212, 2007
www.atmos-chem-phys-discuss.net/7/S208/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulating organic species with the global atmospheric chemistry general circulation model ECHAM5/MESSy1: a comparison of model results with observations" *by* A. Pozzer et al.

A. Pozzer et al.

Received and published: 16 February 2007

Specific comments

We appreciate the constructive comments of the anonymous referee.

Section 1

In the paper the previous work has been largely cited where needed. Nevertheless a short revision of previous studies will be added, although we think this would not improve significantly the paper.

Section 2.1

We agree with the referee that section 2.1 lacks in the description of the chemistry and physics of the model. The necessary information is presented in Jöckel et al. (2006) of the same special issue, which is largely cited in this work (as example: " This study continues a prior analysis which focused primarily on the representation of atmospheric dynamics and ozone",in the introduction, or "The results evaluated here are from the reference simulation S1, as described by Jöckel et al. (2006)". The complete description of the model would be a repetition of an already published work (see also the electronic supplement of Jöckel et al., 2006). Nevertheless, this part will be improved and the suggestions of the referee will be taken into account for the revised version.

Section 2.2

We agree with the anonymous referee #3 that it is inappropriate to name the variance of observations "error". In the "weighted" approach the locations in time and space with high variability have lower weight. In case of the observations, this allows us to get rid off the single episodes and to compare an average value which is more representative. We completely agree that the simple linear fit gives "an overly pessimistic view of the model performance" : often global models are not able to reproduce sin-

ACPD
7, S208–S212, 2007

gle events. Moreover the comparison of background conditions is better suited for the understanding of the processes.

In the special case, the observational data are aggregates of measurements, without detailed timing information. Specific events which have been repeatedly sampled influence extremely the average value, and one of the methods to partially solve this unbalance is to analyse also the variability of the measurements , as done in this work. We completely agree that the variance is a “physical part of the system which a model should be able to reproduce”. In this work, in fact, “weighted” calculations and “unweighted” calculations have both been used. We think that a fair evaluation of the model performance should use both methods to understand not only if the averaged conditions are correctly simulated but also if short episodes are correctly reproduced. We agree to expand this section and to justify more the used of this method.

For comparison with the station observations, the model simulation has been sampled at the lowest model level (surface, because we have terrain-following hybrid-pressure coordinates), and monthly average have been calculated. Monthly means are generally more suited for comparison between global models and observations. We agree to clarify how the model results have been sampled.

Section 5.1

As noticed by the referee, the sentence is badly formulated. There is an improvement with respect to von Kuhlmann (2003), which results can be directly compared with the results of this work.

ACPD

7, S208–S212, 2007

Section 6

The section will be completely revised and Fig. 17 will be removed (see reply to referee #2).

Section 8

Although the suggested hypothesis could explain partially the low impact of an increased CO emission from China, we do not think that the underestimation in the convective transport is the unique cause. Nevertheless a deeper convection would indeed increase the affected area, not only due to transport processes, but also due to a reduced chemical destruction of CO. As shown in Jöckel et al. (2006), the OH radical concentration peaks in the lowest layers and, with a rapid uplift, the lifetime of CO would increase. However, it has to be kept in mind that the CO emissions were not located only in the lowest layer, but they were distributed over different levels (see Ganzeveld et al., 2006). This topic will be addressed specifically in the revised paper of Ganzeveld et al., 2006.

Section 9

We agree in highlighting the effect of model upwind sampling in the conclusion.

Technical corrections

The revised version will include all the suggested technical corrections.

ACPD
7, S208–S212, 2007

References

[] Jöckel, P., Tost, H., Pozzer, A., Brühl, C., Bucholz, J., L., G., Hoor, P., Kerkweg, A., Lawrence, M., Sander, R., Steil, B., Stiller, G., Tanarhte, M., Taraborrelli, D., van Aardenne, J., and Lelieveld, J.: Evaluation of the atmospheric chemistry GCM ECHAM5/MESSy: Consistent simulation of ozone in the stratosphere and troposphere, Atmos. Chem. Phys., 6, 5067–5104, 2006.

[] von Kuhlmann, R., Lawrence, M. G., Crutzen, P. J., and Rasch, P. J.: A Model for Studies of Tropospheric Ozone and Non-Methane Hydrocarbons: Model Evaluation of Ozone Related Species, J. Geophys. Res., 108, 4729, doi:10.1029/2002JD003 348, 2003.

[] Ganzeveld, L., van Aardenne, J., Butler, T., Jöckel, P., Kerkweg, A., Lawrence, M., Metzger, S., Stier, P. Zimmerman, P., and Lelieveld, J.: Technical Note: Anthropogenic and natural offline emissions and the online EMissions and dry DEPosition (EMDEP) submodel of the Modular Earth Submodel system (MESSy), Atmos. Chem. Phys. Discuss., 6, 5457-5483, 2006.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 127, 2007.