Atmos. Chem. Phys. Discuss., 7, S4038–S4041, 2007
www.atmos-chem-phys-discuss.net/7/S4038/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Nitrogen compounds and ozone in the stratosphere: comparison of MIPAS satellite data with the Chemistry Climate Model ECHAM5/MESSy1" *by* C. Brühl et al.

C. Brühl et al.

Received and published: 14 August 2007

1 General

We thank the reviewers for their suggestions for improvements. Unfortunately, NO observations by MIPAS in sufficient quality to allow for a budget analysis are available only for the period shown in the paper and a few individual days in winter 2003/04. This was clearly said in the section on the data and this prevents an analysis based on monthly means for different seasons. For compounds like N_2O, HNO_3 and ozone this was done in Jöckel et al. (2006). The main new idea of the paper was, however, to show and analyse all nitrogen compounds simultaneously which is also the reason for

so many figures.

2 Response to referee #2

The approximate uncertainties of the MIPAS measurements of NO are given in the paper cited for NO_2. For the dataversion used in the reference these estimates are somewhat optimistic but for the most recent version they are appropriate (on behalf of B. Funke). The text will be corrected.

The referee is right that also panels of Figure 1 with percentage differences might be useful for comparison with the experimental uncertainties. Because of very small or even zero values of some species we prefered the absolute differences but we will modify the paper to accomodate that, maybe by using the electronic supplement.

We will also expand the discussion on the pathway from NOx to HNO_3 in section 4.2. The correlation coefficient for NO in the scatter plots contains the night-time zero values. If daytime only is analysed, the correlation is indeed much worse than 0.93. We will modify the text for clarification.

3 Response to referee #3

We don't agree that only the 2D (zonal average) view matters. If also the 3D view of a model agrees with the observations is important new information. Using orthographic projections only would require figures for each hemisphere and has the disadvantage that the tropics are almost not visible. Concerning the technical aspects we will adjust the color scales for easier reading of the differences in the revised version.

About one page in the online version discusses Figure 6 and the PDFs of model and

ACPD
7, S4038–S4041, 2007

observations can clearly be distinguished. Obviously the comment is based on an old preliminary version of the manuscript.

The focus of the paper is NOy and for that a longer timeseries of MIPAS data is not available yet. For species like N_2O a paper discussing different seasons is in preparation and results were shown at AGU and EGU conferences. The bias at the subtropical barrier is indeed (more or less) persistent.

The discussion on the horizontal resolution and solar zenith angle effects will be expanded by a more detailed analysis, including a separate comparison of day and night data. As said in the text, MIPAS data are given every 5 degrees in latitude while the model resolution is 2.8 degrees. Poleward of 87.9^o there are no model gridpoints while there are MIPAS observations close to 90^o. More on this subject will be given also in the reply to the detailed suggestions of referee #4 which will be available soon.

3.1 Minor points

The simulation was from 1996 to 2005 as said in the model description. This detail is not so important to be mentioned in the abstract. Annual means are not the focus of this paper, that is given elsewhere (see references!).

'Nudging of tropospheric meteorology' is used here as efficient method for the evaluation of stratospheric chemistry, above 200hPa the CCM is calculating its own dynamics with full feedback (see Jöckel et al., 2006). More details on that are also given in the text on page 4 (online version). Nevertheless we will slightly expand the text to avoid missunderstandings.

Most of the information on NLTE-NO-retrieval is given in Funke et al (2005), more details will be given in: Funke, in preparation: "Upper atmospheric NOx intrusions into the Arctic stratosphere during January - April 2004".

ACPD
7, S4038–S4041, 2007

EGU

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 9899, 2007.

ACPD

7, S4038–S4041, 2007

Interactive Comment

EGU