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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the ability of chemical transport models to simulate the vertical structure of the N_2O, NO_2 and HNO_3 species in the mid-latitude stratosphere" *by* G. Berthet et al.

Anonymous Referee #1

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General comments

This paper presents and interprets a valuable dataset, featuring in-situ measurements of N2O, NO2 and HNO3 collected on a balloon-flight in the mid-latitude in October 2002. This paper is a useful addition to the analysis and comparison of measurements in the stratosphere which are used to improve the quality of CTM calculations and understanding of the NOy chemistry. The authors have made a good job of improving the quality of the presented CTM calculations by using 3-hourly winds obtained from ECMWF forecasts. Overall my opinion is that the paper clearly merits publication in

ACP, although I have a few comments below that should be considered by the authors.

Specific comments

Pg. 12375, l. 20f.: "This seems to demonstrate that dynamical effects constitute the major part of the discrepancies..." I cannot see how the cited references justify this statement. This may be the conclusion of this paper and should therefore be put into section 7.

Pg. 12377, l. 2: Please include a short paragraph how the errors are calculated. Please give the accuracy of the measurements rather than the precision.

Pg. 12378, l. 4 & Fig.1: Are there any other measurements to which your profile can be compared. E.g. instruments onboard ENVISAT or HALOE measurements...?

Pg. 12378, l. 19 & Fig.2: Why haven't the potential vorticity values also been calculated for the proposed mixing event altitude at 27km. Please change Fig.2 accordingly. I understand that the analysis of the mixing event is out of the scope of the paper. Nevertheless I strongly suggest to include the mentioned CH4-N2O correlation in a new Figure which would make section 4.1.1 much easier to follow.

Pg. 12379, l. 17: Why haven't been the CTM results interpolated to the corresponding mean measurement positions of the SPIRALE instrument? Please give at least an estimation of the introduced errors.

Pg. 12379, l. 20f.: Please point out that the Reprobus overestimation of N2O above 30 km is in contrast to former MIPAS/KASIMA comparisons showing a distinct underestimation of N2O above 28km (see Stowasser et al., 2003; Wetzel et al., 2002).

Pg. 12381, l. 24: Since only results for NO2 and HNO3 are given, please change into "... that the NO2/HNO3 partitioning seems to be correctly reproduced"

Pg. 12382, l. 18: "It can be seen that using 3-hourly winds clearly leads to more realistic N2O values....". Please omit "more realistic N2O values" unless you compare

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the model results to a satellite data product in a new Fig. 6c.

Fig. 7 and Fig. 8 seem rather useless since the information can easily plotted in the corresponding Fig. 1 and Fig. 4.

Technical comments

Fig.3,9,10: The labels are too small Fig.6: The label "8UT" is cut

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 12373, 2005.