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Interactive comment on "An evaluation of the performance of chemistry transport models, Part 2: detailed comparison with two selected campaigns" *by* D. Brunner et al.

D. Brunner et al.

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We would like to thank the referee for careful reading of the manuscript and many helpful comments which we have addressed as follows.

Specific comments

1. Use "evaluation" rather than "validation" in the sentence "A large number of such models have been developed over the last decades and the demand for validation has increased accordingly."

Response: We have changed this to the following: A large number of such models

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have been developed over the last decades and the demand for evaluating how well they are able to reproduce available observations has increased accordingly.

2. Not clear whether P3 aircraft measurements are included.

No, they are not included. We only analyzed the DC-8 measurements here (but P3 measurements were included in the overall analysis in our first paper). This is made clear now by beginning Sect. 3.1 as follows: “Figure 2 shows composites of PEM-Tropics A measurements in which the time-series of all individual flights of the DC-8 aircraft are merged to a single figure.”

3. Some NO profile measurements near Tahiti seem to be missing in Fig. 3.

We have checked whether we may have inadvertently lost any NO profile measurements at Tahiti but could not find any mistakes in our data processing. Please remember that we are only using the 5-min merged data, not the original high resolution measurements. 5-min averages are sufficient for the comparison with our models in the case of cruising level data. However, for profiles a higher time resolution would be desirable and we are currently in the process of increasing the time resolution of the entire TRADEOFF data base to account for this. Note also that the measurements have been binned into 1 km altitude sections as described in Sect. 3.1.5. Measurements are only displayed if more than one observation is available in the bin. In the case of NO there is often only one single 5-min sample per bin and therefore there are some gaps in the profile. However, the overall shape of the profile is recognisable and those points not displayed would fit very well into this. Until now we have only included measurements within a range of 2.5 deg around Tahiti for the profiles. By increasing this to a 3.5 deg range we have indeed been able to improve the data coverage somewhat, most notably for the HNO3 profiles. Figure 3 has been updated accordingly. Since the differences from the old figure are only small this does not change any of our conclusions.

4. Number of flights and their dates, shown in the Tahiti profiles, should be mentioned.

ACPD

4, S3281–S3283, 2004

Basically all flights from and to Tahiti contribute to the profiles but not every parameter is available for every flight (this is particularly true for NO). The flight numbers are indicated in Fig. 1. We have added the following sentence: All flights to and from Tahiti displayed in Fig.1a contribute to this figure. Since we have not mentioned the exact dates of the individual flights anywhere else in the text we would not like to do this here just for the profiles. We used the same numbering as originally used for the campaign. Detailed information on individual flights can therefore easily be obtained elsewhere, e.g. in the referenced campaign overview papers.

5. Mention in Sect. 3.1.5 that different wash-out schemes may also contribute to differences in HNO3.

It is very likely that the different washout schemes are contributing to the large differences between the models seen for HNO3. This is already discussed later in Sect. 3.3 (so we prefer to postpone this discussion to that Section).

6. PAN in CTM2 is not too bad.

Average PAN concentrations are indeed well reproduced by CTM2 for PEM-Tropics A. We have changed the text as follows: Simulated PAN concentrations compare poorly with the measurements in terms of skill score. Mean concentration levels are well reproduced only by CTM2 (see Table 1), while they are generally overestimated in TM3 and strongly underestimated in TOMCAT.

Technical corrections:

We have followed all the recommendations of the referee concerning minor corrections.

We have eliminated the + symbols in Fig. 7 which were not supposed to be there.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 7355, 2004.