Anonymous Referee #3

We thank the reviewer for investing her/his time in this review and greatly appreciate her/his constructive comments and suggestions, which lead to clear improvements on the manuscript. Below we give a detailed response to each individual point.

The article titled "Transpacific pollution transport during INTEX-B: spring 2006 in context of previous years" is an important study that makes the INTEX-B special issue of ACP more complete by connecting the results from a short campaign to overall state of the atmosphere. Since aircraft campaigns deliver only sporadic data, it is important to assess representativeness in time and space of that data. This is what the article aims to do. The approach of the paper is very thorough, spanning aircraft, satellite and model derived CO concentrations. Below are my specific comments.

1. p17819: proper citation of past literature. There have been a lot of articles in recent years (after 2004) on transpacific transport and none are mentioned. Reviewer 1 suggested a few, but left out Zhang, L. et al. 2008, Zhang, L. et al. 2009 and at least few others.

Zhang et al. [2008] and Zhang et al. [2009] have been added in the Introduction. In addition to the papers listed by Reviewer 1 we added three other references: Yienger et al., 2000; Jaffe et al., 2001.; Liu and Mauzerall, 2005.

2. p17820, line 9: "is destroyed by oxidation of OH" should be changed, since it's not OH that is oxidized.

"destroyed by oxidation of OH" has been changed to "through oxidation by OH".

3. p17821, lines 14-15: "limit the MOPITT data to daytime retrievals". Could you comment on what bias that introduces? Especially since the positive aircraft bias is so nicely addressed in the paper.

The reasoning behind the sole use of daytime retrievals is the higher sensitivity of MOPITT daytime over nighttime retrievals. Because of the different retrieval sensitivity, especially over land, it is not recommended to mix daytime and nighttime retrievals in the analysis. Limiting the MOPITT retrievals to daytime is not expected to introduce any additional bias. This is also because free tropospheric CO does not show a diurnal variation. Some more explanation has been added to Section 2.1.

4. p 17823: It would be great to see the number for annual global total CO emissions, for reference. No need to add it to the table.

The annual average global CO emissions are about 1230 Tg. This has been added.

5. p17825, line 1: "monthly mean MOPITT averaging kernels". I think the need for such coarse monthly approach should be explained in the text, since the default should be to use individual orbit averaging kernels.

Please see answer to the next point.

6. p 17825, lines 12-17: I'm confused why isn't the model sampled along MOPITT orbit and considered only where MOPITT data is available for monthly mean purposes mentioned here.

We agree, that the preferred way is to sample the model along MOPITT orbits and this would have allowed us to overcome the discrepancy between the model's true monthly mean and the MOPITT monthly mean product. However, due to limited computing resources we were, at the time of the study, not able to produce daily output for the seven year period.

The MOPITT L3 gridded product has been developed to provide a high quality scientific data set and high consistency in the calculation of monthly mean averaging kernels. The major differences in averaging kernels exist between land and ocean and between daytime and nighttime. By selecting our regions to cover mostly ocean or land and by limiting the analysis to MOPITT daytime retrievals, we ensure that averaging kernels with mostly similar characteristics are combined. We further believe, that the averaging over larger regions and time periods (2 months) as well as the analysis of relative variability instead of absolute numbers justifies using a monthly mean product.

As additional evaluation of the modeled interannual variability we now include also a comparison to four NOAA surface sites (Sections 2.4 and 3.1 and Figures 3 and 5) in the revised manuscript.

7. p 17825, line 24: Merritt et al. 2009 should probably be Deeter et al. 2009

This has been corrected.

8. p17826, line 12: "These are very similar to results when the satellite retrieval . . .". I'm looking at Figure 3 and the variability of MOZART_AK vs. MOZART_noAK is opposite, so they don't seem similar. Meanwhile, in Figure 3, the CO burdens in all cases look the same. Is this what is meant by "results"? It would be very helpful if the scale on CO burden was changed to be more meaningful. Alternatively, if the burdens are in fact all the same, then maybe there is no need to show them.

In our original discussion we have not been very clear and we appreciate that the reviewer points this out. We modified Figure 3 (revised Figure 4) to show burdens more clearly and made it easier to distinguish between different columns. We further made changes to Table 2 and revised the text in Section 3.1.

MozVar_noAK in Figure 3 (revised Figure 4) is actually the "true" tropospheric burden integrated over the entire troposphere and is used to demonstrate the impact of the MOPITT retrieval sensitivity. While the absolute burden for MozVar_noAK is, as expected, larger than the burden for MozVar_AK, both show very similar results in terms of interannual variability.

In order to justify the use of a simple altitude integration of the model tracers in support of the analysis of MOPITT data, we added in Table 2 a column with results for total CO when the MOPITT averaging kernels are applied (CO_AK). These are related to the MozVar_AK results in Figure 4, but in Table 2 we list deviations in absolute terms, while in Figure 3 (revised Figure 4) percentage deviations are plotted. CO_AK shows a similar mean burden and inter-annual variability as the CO burden derived from integrating over the specified altitude range.

We also would like to add that in the original document there were some differences between the area definitions used for Figure 3 (revised Figure 4) and those used for Table 2. In both the same limits for the latitude and longitude bounds of PAC and US were used, but because the calculations were based on different grids (the MOPITT L3 product grid of 1 deg x 1 deg for the MOPITT analysis in former Figure 3, the model grid of 2.8 deg x 2.8 deg in Table 2) the results in Figure 3 (revised Figure 4) covered a slightly smaller area and therefore showed

a slightly lower burden. While this has no significant impact on the general results and conclusions, we corrected for this mismatch in the revised manuscript.

9. p17826, line 27-28: Is this range with or without the MOPITT drift?

No correction for the drift in MOPITT data has been applied. As stated in Deeter et al. [2009] this drift is < 1% in the V4 product used in this study, which is clearly less than the interannual variability.

10. p17828, line 27: “others” should be “other”

Thanks, this has been corrected.