

## ***Interactive comment on* “Evaluation of model-simulated source contributions to tropospheric ozone with aircraft observations in the factor-projected space” by C. Shim et al.**

### **Anonymous Referee #2**

Received and published: 26 November 2007

Shim et al present an interesting analysis of observed and model tropospheric ozone using a statistical technique (positive matrix factorization, PMF) that identifies individual factors that determine ozone variability, e.g., surface emissions, transcontinental transport, stratosphere-troposphere exchange. The PMF methodology has been published once before but is now applied to model and observations to test model source contributions to tropospheric ozone. Here, the authors apply the PMF technique to two contrasting aircraft datasets: TOPSE and TRACE-P.

The one broad criticism of the paper is that it is unclear from reading the manuscript what I learnt from the PMF method applied to TOPSE and TRACE-P data that could

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not have been understood from applying more traditional model analysis methods. The advantages of PMF should be stated more clearly throughout the paper.

### Specific comments

- In section 2, there is little discussion of previous GEOS-Chem work on stratospheric-tropospheric exchange (STE) of ozone. Does the model simulate reasonable STE estimates?
- In section 2, is there is little discussion about potential temperature. Do the authors know how good GEOS potential temperature is?
- In section 2, there appears to be little quantitative information about budget terms for ozone precursors, etc.
- Section 3.1, first paragraph. Why is ozone data > 100 ppb included then not included in subsequent steps? The reason needs to be clearer for the reader.
- Equation 4. Why is there no model error in this equation?
- Reminder the reader what constitutes the units of  ${}^7\text{Be}$ .
- Section 3.1.2. Can the authors definitively state that the overestimate in Liu et al is too large given that their model (meteorology) will be different to that used by Liu et al?
- Typos in lines 24 onwards in section 4. ...last(ed) longer....compar(ed)...Despite (of) reasonable...
- Tables 1-5 are very confusing. Is  $r$  the same as  $R$ ? I question whether  $R$  should be in the Table at all. Surely "Factors" should be where  $R$  is?

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- Figure 1 looks strange to this reader. The associated caption should tell the reader that the authors have plotted only data filtered by  $^7\text{Be}$ .

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 15495, 2007.

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