**Atmospheric
Chemistry
and Physics
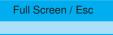Discussions**

Interactive
Comment

Interactive comment on "Characterization of volatile organic compounds (VOCs) in Asian and North American pollution plumes during INTEX-B: identification of specific Chinese air mass tracers" *by* B. Barletta et al.

Anonymous Referee #1

Received and published: 30 April 2009

Characterization of volatile organic compounds (VOCs) in Asian and North American pollution plumes during INTEX-B: Identification of specific Chinese air mass tracers

This manuscript utilizes data collected over the central North Pacific during the NASA INTEX-B airborne mission. Specifically, they used VOC data together with kinematic back trajectories to identify the source region for five plumes from China, four from other Asian regions, and three from the U.S. The analysis found that Chinese plumes were enriched in carbonyl sulfide and methyl chloride. Plumes originating from the U.S. had elevated levels of CFC replacement compounds, particularly HCFC-134A.

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In conclusion they recommend that the suite of carbonyl sulfide, methyl chloride, 1,2-dichloroethane, and Halon-1211 be used to identify Chinese emissions.

General Comments:

This manuscript presents a very straightforward analysis of VOC data obtained from aircraft flights. Although the results of the analysis are reasonable, a more rigorous approach would strengthen the manuscript. The use of a statistical technique such as Principal Component Analysis is a commonly applied to this type of data. This approach (or similar one) would be objective, and remove the largely subjective comparisons of mixing ratios in the present analysis.

The verb tense used in the manuscript needs to be consistent. The current version contains a mixture of present and past tenses. I prefer to use past tense in research papers. The text is vague in its usage of INTEX-A data; geographically where were these samples obtained? Since the background data shown in Figure 4 does not appear to be significantly different between INTEX A and B, I would put the actual values in a Table to make it easier for readers to utilize this information and cite it. It would be preferable to conduct a t-test on these two distributions to add rigor. To me, the background data is informative and a nice documentation to have in the literature. In fact, I would consider putting all the background data in one Table, and the plumes in another. In general, the discussion in many places (especially concerning the figures) could be enhanced. I question whether Table 3 and Figure 8 are needed. Finally, I would try to highlight the continued usage of halogenated compounds. This information is not being given the attention it should be receiving.

Specific Comments:

Figure 1 is a bit hard to read. Perhaps using a lighter color for the bulk of the data would make it more readable.

Figure 2 – I can't make out the green and yellow colors on this figure. This seems to

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only show the INTEX-B flights – it would be helpful to see the INTEX-A flight tracks where data was used in the manuscript.

p. 7754, line 11 – might want to be more quantitative here and state the magnitude of variability compare to the mean or median.

p. 7754, line 14 – isn't combustion the only known source of ethyne?

p. 7755, line 29 – what is the "expected general trend" shown in Figure 3? You should indicate that the INTEX-B represents non-plume data (re-label?).

p. 7755, lines 1-5 – how do the times estimated from the trajectories compare to the time frames suggested by the acetylene/CO ratios? For example, Talbot et al., [2003] report the ratio has values greater than 9 in the Shanghai plume. Are the transport times listed in Table 1 consistent with chemical clock estimates?

p. 7756, lines 16 – 24 – comparing mixing ratios is rather tricky. What is said is generally true, but comparing mixing ratios in a random plume with those from earlier studies is highly uncertain. If I understand what you did correctly, your actually comparing U.S. outflow over the North Atlantic during INTEX-A with the Pacific plumes sampled during INTEX-B. Is this a fair comparison, and is it even meaningful? Or were the INTEX-A plumes the few sampled over the Pacific? Overall, this is a bit confusing here.

p. 7756, line 26 – what justification is there for choosing the lowest 50% as the hemispheric background. Why not use the lowest 10% excluding stratospheric data?

p. 7757, lines 14 – 17 – These two sentences need to be re-worked, especially the second one. These two factors have already been implicated above. What are the other factors?

p. 7757, lines 24- 26 – re-write this sentence (anthropogenic is used twice).

p. 7758, lines 6 – 7 – re-write to say that emissions sources are still active despite the Protocol (I would also cite the paper by Krol (Krol, M. C., J. Lelieveld, D. E. Oram,

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G. A. Sturrock, S. A. Penkett, C. A. M. Brenninkmeijer, V. Gros, J. Williams, and H. A. Scheeren (2003), Continuing emissions of methyl chloroform from Europe, Nature, 421, 131-135).

Tables 1 & 2 – it would be good to indicate the number of samples in each grouping.

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