

***Interactive comment on “Acetylene  
C<sub>2</sub>H<sub>2</sub> retrievals from  
MIPAS data and regions of enhanced upper  
tropospheric concentrations in August 2003” by  
R. J. Parker et al.***

**Anonymous Referee #2**

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The purpose of this manuscript is to introduce the acetylene data from MIPAS and to show that acetylene is correlated with CO in the upper troposphere.

1. Does the paper address relevant scientific questions within the scope of ACP? Yes.
2. Does the paper present novel concepts, ideas, tools, or data? Yes, the MIPAS acetylene data.
3. Are substantial conclusions reached? No. The conclusions are rather speculative at best.

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4. Are the scientific methods and assumptions valid and clearly outlined? No. The authors should use a global or a trajectory model to support their speculative conclusions.
5. Are the results sufficient to support the interpretations and conclusions? The conclusions are weak.
6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes.
7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? I believe so.
8. Does the title clearly reflect the contents of the paper? Yes.
9. Does the abstract provide a concise and complete summary? No. It is wordy and could be significantly shortened.
10. Is the overall presentation well structured and clear? Yes, but the conclusions are speculative.
11. Is the language fluent and precise? The text is verbose.
12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes.
13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Yes. The text is wordy.
14. Are the number and quality of references appropriate? No, as indicated below.

Main Comments

The purpose of the manuscript is poor: “In this paper, a description is provided of global retrievals of C<sub>2</sub>H<sub>2</sub> performed from MIPAS infrared limb emission spectra for the upper troposphere.” The manuscript does not include any evaluation of the new product with

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observations, such as from aircraft. While the new data may be of scientific interest, it is not shown how this new product is better/worse than other existing products, such as ACE. The only comment is "These data provide greater temporal and spatial resolution than the ACE instrument albeit with a much lower signal to noise (SNR) compared to the solar occultation method employed by ACE." I recommend adding a section on the evaluation of the data and another section on a comparison of ACE and MIPAS acetylene so that the reader can judge the quality of the MIPAS data.

The purpose of the manuscript does not include a scientific objective in the introduction. I believe that this objective is listed in the first line of Section 3: "The objective of this work was to examine the C<sub>2</sub>H<sub>2</sub> spectral signatures in MIPAS L1B spectra with a full optimal estimation retrieval algorithm in order to identify regions of high C<sub>2</sub>H<sub>2</sub> volume mixing ratios (VMRs)." Again, this purpose is poor. Can't one use aircraft data and ACE data to identify regions of high C<sub>2</sub>H<sub>2</sub>? Can one only use MIPAS data for this purpose? What is unique about the MIPAS acetylene data set?

The scientific significance is poor as the authors' results are primarily speculative. The authors should use a global model or a trajectory model to diagnose transport pathways and to show how the ratio of C<sub>2</sub>H<sub>2</sub> to CO may be used to diagnose such transport pathways. Such work would provide support for the author's speculative statement in the last paragraph of the abstract: "Overall, the data show the distinctive nature of C<sub>2</sub>H<sub>2</sub> distributions, confirm in greater detail than previously possible features of hydrocarbon enhancements in the upper troposphere and highlight the future use of MIPAS hydrocarbon data for testing model transport and OH decay regimes in the middle to upper troposphere."

The discussion in Section 4.3 would benefit from a literature search on the cross-tropopause transport of pollution, such as recently shown with Aura Microwave Limb Sounder (MLS) CO and HCN data. Again, the conclusions are only speculative. A model should be used.

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The discussion in Section 4.4 would benefit from a literature search on the Asian monsoon.

The summary of conclusions in the last paragraph is not supported without an evaluation of the data.

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 29735, 2010.

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