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Interactive comment on "Detection of organic compound signatures in infra-red, limb emission spectra observed by the MIPAS-B2 instrument" *by* J. J. Remedios et al.

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The authors demonstrate the feasibility to infer mixing ratios of organic compounds from MIPAS-B2 limb emission spectra. However, their methodical approach needs clarification with respect to the following points:

1. The authors suggest that adjusting the simulated residual spectrum

$$\Delta F = R_F - R_{F-GAS}$$

to the measured residual spectrum

$$\Delta Y = R_y - R_{F-GAS}$$

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is superior over adjusting the simulation R_F to the measurement R_y. To adjust, however, means to minimize the difference according to some norm. Since

$$\Delta F - \Delta Y = R_F - R_{F-GAS} - (R_y - R_{F-GAS}) = R_F - R_y,$$

it is not quite obvious to me, what the difference between adjusting spectra and adjusting residuals actually is. I have not understood what is new about this approach. Or has no quantitative retrieval been made but only adjustment by eye? If so, is there any scientific reason for this? The text should be clearer about this.

2. In the abstract the authors report accuracies of 30–50% for their PAN retrieval. This, however, seems not to be supported by the error analysis. The error analysis (Sect. 5) seems not to have to do very much with the retrievals reported, because

- No constraint is mentioned in Section 3.1. while an optimal estimation constraint is referred to in Section 5. Such a constraint will, of course, lead to errors smaller than those of an unconstrained retrieval.

- The gain matrix in Section 5 refers to an inversion problem in one step for the entire profile, while retrievals in Section 3 are onion peeling retrievals, where profile points are evaluated in sequence.

- Additional variables (concentrations of principal atmospheric gases, aerosol extinction, temperature, pressure) are adjusted along with the target gases in the retrieval but treated as systematic errors in Section 5.

The error analysis in Section 5 seems to be a feasibility study quite independent from the actual retrievals. Nevertheless, the abstract, where the estimated errors are reported along with the retrieved results, suggests that the authors apply the result of this feasibility study to their retrievals. This is very misleading: There

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seems to be a conflict between what appears to have been done and what actually has been done. Is there any particular reason why no error estimation for the results actually presented has been made?

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 10021, 2006.

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