

Interactive comment on “Stratospheric loss and atmospheric lifetimes of CFC-11 and CFC-12 derived from satellite observations” by K. Minschwaner et al.

Anonymous Referee #1

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This article aims to estimate CFC-11 and CFC-12 lifetimes using observations from several satellite data products (CLAES, CRISTA-1 and -2, MIPAS and ACE are used). The approach is clearly described and the paper is well written. I think the article makes a valuable contribution to ongoing global efforts to evaluate CFC lifetimes, and can be published in ACP with only minor corrections.

Specific comments:

- Only one month of CRISTA-1 and CRISTA-2 measurements were used. However, the authors do not state why longer periods were not available for these instruments. A line or two explaining this would be helpful to readers not familiar with the details of

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these missions. Furthermore, might we not expect a “sub-sampling” error on the two lifetimes estimates derived using these instruments due to the data not fully spanning potentially real seasonal or inter-annual (e.g. QBO-related) lifetime changes?

- P28734, L22. A supporting reference (model-based lifetime calculations) would be helpful.

- P28735, L1. I do not think Prinn et al., 2000 is the most suitable reference here because I don't think they aimed to reevaluate lifetimes in this paper. Perhaps Cunnold et al., 1983, in which ALE data were used to estimate the lifetime of CFC-11 would be more appropriate?

- Section 3: This section is quite long with a large amount of information on a range of subjects. It might be helpful to the reader to sub-divide this into appropriate sub-sections.

- P28741, L16. Constant surface mixing ratios were used. Do you expect that ignoring the surface latitudinal gradient would induce a significant error?

- P8744, L15. The uncertainty analysis for the individual lifetimes is clearly described in the appendix. However, I'm confused about how the multi-instrument mean uncertainty was arrived at. Furthermore, I don't quite follow the point the authors are making when they say that errors associated with the stratospheric profiles were neglected (aren't these the largest sources of error?). These lines need to be expanded and clarified a little to make clear how these uncertainties were calculated.

- P28746, L25: ... in constraining THE oxygen absorption. ...

- P28747, L6: ... appearing in THE loss rate calculation. ...

- P28747, L25: "...no averaging kernels are considered for the error analysis". Please clarify exactly what is meant here.

References

Cunnold, D. M., Prinn, R. G., Rasmussen, R. A., Simmonds, P. G., Alyea, F. N., Cardelino, C. A., Crawford, A. J., et al. (1983). The Atmospheric Lifetime Experiment 3. Lifetime Methodology and Application to Three Years of CFC13 Data. *Journal of Geophysical Research*, 88(C13), 8379–8400.

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