

Interactive comment on “Stratospheric lifetimes of CFC-12, CCl₄, CH₄, CH₃Cl and N₂O from measurements made by the Atmospheric Chemistry Experiment-Fourier Transform Spectrometer (ACE-FTS)” by A. T. Brown et al.

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Reviewer 2:

1. p4223, l2-3, 5-6: The regions where the Cl and F containing molecules are much wider, e.g. CFC-12 absorbs around 920 cm⁻¹ and many other molecules like CFC-142a/b etc. have absorption bands in the 1400 cm⁻¹ wavenumber region. The statements here should be corrected for this.

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The paper has been changed accordingly:

“C – F bonds typically absorb radiation in the 1400 - 1000 cm⁻¹ region (<http://nwir.pnl.gov/>;Lide, 1990), a region which is relatively clear from atmospheric absorption from other species making fluorine-containing molecules powerful greenhouse gases.”

2. p4224, l22-27: Is a vertical resolution of about 2-3 km as provided by ACE-FTS (p4225, l17) really sufficient to resolve the tropopause? I think this issue needs further discussion.

This was an error in the paper the resolution at the tropopause is in fact closer to 1 km at the tropopause (Hegglin et al., Atmos. Chem. Phys., 8, 1483, 2008)

3. p4227, l9 ff: The concept of correction for a non-linear tropospheric increase by calculating an effective linear growth rate has not become clear to me. Some more details on this methods should be provided.

See comments above on the calculation of effective linear growth rate

4. p4227, l20: a Λ factor seems rather high to me, other publications refer to Λ of 0.7 (Vaugh and Hall, 2002) or 0.8 (Garcia et al., 2011). How would the results of your study alter with other values for Λ ? A discussion on this question should be added.

This value was chosen for ease of comparison with the work carried out by Laube et al., (2012). The error calculations carried out in the work included the error introduced by using a large Λ value (1.75) and a smaller value of Λ (0.7).

5. p4229, l1: Does the scarcity of ACE-FTS data not allow to perform a seasonal analysis? What was the reason for restricting the analysis to periods of 6 months? I think a seasonal analysis would be much more appropriate to the problem, in particular if the paper aims at excluding any seasonality of the calculated lifetimes, as stated on p4235, l 22.

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See comments above

6. p4229, l8 ff: This section is a bit difficult to understand and the arguments should be re-ordered. Why not starting with the statement that the analysis has been limited to the mid-latitude well-mixed region and provide the arguments for excluding the tropics and the polar region afterwards? In this context the statement “unrelated to stratospheric lifetimes” (l12) seems a bit too radical to me. Further, the term “MAD filter” is already used at page 4230, l1, but introduced at p4230, l12 only. The description of this filter is a bit vague to my opinion.

These changes have been made to the paper

7. p4223, l23: Wouldn't be Solomon et al., 2010 the more appropriate reference?

This reference has been changed

8. p4225, l12: A more appropriate reference for the ATMOS missions which should at least be added is probably Gunson et al., 1996.

This reference has been changed

9. p4225, l22: Actually it's almost 10 years by now.

The value has been changed

10. p4233, l20/21: Improve the wording of this sentence: “The lifetimes calculated CH₃Cl and CH₄ show significant variation between the calculated lifetimes.”

The wording has been changed to: “The calculated lifetimes of CH₃Cl and CH₄ show significant variation.”

11. X-axis labels and descriptions for the figures A1 to A3 are missing. Axis descriptions, axis labels and figure titles are too small throughout the paper, but in particular for Figures A1 to A3.

Font sizes have been increased and the figures relabelled. The caption now explains

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the x axis values.

12. Table A2 and A4: There are no entries NHW etc. in the tables the table caption refers to.

These changes have been made

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