

Interactive comment on “Global emission estimates and radiative impact of C_4F_{10} , C_5F_{12} , C_6F_{14} , C_7F_{16} and C_8F_{18} ” by D. J. Ivy et al.

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We would like to thank the anonymous referee for their helpful and thorough comments. We have listed the referee’s comments in italics and then written a response below each one. We’ve additionally included text from the paper when it has been changed based on a comment.

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Referee 1: “The paper is a useful continuation of the companion paper by Ivy et al already published in ACP on perfluorocarbons. It presents state of the art estimates of the anthropogenic emissions of these powerful greenhouse gases and gives a good overview on the existing literature and own work, including measurements of infrared spectra and calculations of radiative forcings.”

Author Response: Thank you for the thoughtful comments.

Referee 1: “It is not true that there are no reanalysis meteorological data available prior to 1990 (section 2.1), there is for example ERA-40 with useful data from 1979 to 2000 (e.g. Uppala et al, 2005) and ERA-Interim from 1989 (1979) to present (e.g. Dee et al., 2011). ERA-40 data are

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available also prior to 1979 but more uncertain or with biases. A sensitivity study on this would be useful. At least there should be more discussion.”

Author Response: The ERA-40 data were not available for use in MOZART; tests using the full-chemistry of MOZART found too much intrusion of stratospheric ozone into the troposphere when the ERA-40 data were used. Subsequently ERA-40 has not been extensively used with MOZART (Emmons, L., personal communication, 2012).

Referee 1: ***“Concerning the model description (section 2.3), is the model spectral (the resolution would correspond to T42)?”***

Author Response: MOZARTv4.5 uses a regular grid and is not spectral.

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Referee 1: ***“Are the sinks by Lyman alpha photolysis and other processes included? They have an effect on lifetimes and inverse modelling of emissions. The issue is mentioned only in section 3.3 where it is confusing.”***

Author Response: The sinks were not included in the inverse modeling. We estimate an error of less than 1.6 % in the derived emissions due to the neglecting of the atmospheric sinks; this error is much smaller than the final estimate error derived in the inversion.

Referee 1: ***“Table 1 partially repeats data given in a table in Ivy et al (2012). It might be more useful to shorten this and present instead the integrated band strengths of individual spectral regions of the new measurements given in Figure 3.”***

Author Response: We have kept Table 1 as is, as

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the companion paper references this one; we have additionally added another table with the integrated band strengths (Table 2).

Referee 1: “It is not necessary, to give the Ivy-reference in the abstract since it is also in the introduction.”

Author Response: Thank you for the suggestion. We have removed the citation from the abstract.

Referee 1: “Eq. (1) should be included directly after line 9 on page 12992.”

Author Response: We have moved Eq. (1) to be included directly after line 9.

Referee 1: “Isn’t there a more recent reference for EDGAR4.2 than the old website for EDGAR4.0?”

Author Response: The reference cited is the

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reference mentioned on the EDGAR website. We have updated our citation to reflect the release of EDGARv4.2.

Referee 1: “The first sentence of section 4 appears to be messed up, please rearrange.”

Author Response: We have rewritten the sentence to: “The reference run of modeled mole fractions using the bottom-up estimates from EDGARv4.2 (see Sect. 2.2) in MOZARTv4.5 are presented in Fig. 1; the reference modeled mole fractions are lower than the atmospheric observations for the high molecular weight PFCs.”

Referee 1: “The reference Ivy et al (page 13004) contains a lot of typos, including the doi.”

Author Response: Thank you for noting this. We have fixed the reference.

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Referee 1: “Please include for clarity in the caption of table 1 “by mass” after global warming potential. I suppose you mean that, there is also the alternate definition by volume in the literature.”

Author Response: We have added “by mass” to the Table 1 caption.

Referee 1: “In figure 2 the legend appears to be incomplete (fire extinguisher?).”

Author Response: Thank you for finding this; we have updated the legend to fire extinguishant.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 12987, 2012.