

Interactive comment on “Long-term tropospheric trend of octafluorocyclobutane (c-C₄F₈ or PFC – 318)” by D. E. Oram et al.

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Received and published: 2 November 2011

We thank the reviewer for their very positive review and address the issues raised below.

Ref comment:

My main concern about the material is related to the estimated annual emissions derived from the

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Cape Grim archive. Because of the uncertainty in the source of the gas, the resulting temporal pattern of emission calculated from the 2D model should provide evidence of the changing source emissions. The peculiar results seem to shed no light on the potential unknown sources for PFC-318. The question then is how reasonable or uncertain is the derived emission history. It seems that the period of the 1990's has a greater variability in the measurements compared to more recent samples from the archive. It would help, I think, to present some discussion of how the measurement uncertainty impacts the derivation of the trend, and what is the resulting uncertainty in the emission history.

Author response:

In an attempt to assess the uncertainty in our model-derived emissions we show in Figure 1 the

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model-derived concentrations of c-C₄F₈ at Cape Grim based on simply increasing and decreasing the “best fit” emissions by 10%. As can be seen in Figure 1 the entire data set (with the exception of one sample from 1978) fits within these 2 extremes, suggesting that the uncertainty in the global emissions is less than $\pm 10\%$.

Ref comment:

One minor point: lines 1– 5, p 19098 unnecessarily repeats the issue of the very small impact of non-ideal gas behaviour presented earlier in the Experimental section (line 21, p. 19094).

Author response:

Without knowing the exact methods of Saito et al. we cannot assume that the effect will necessarily be very small. However, we have changed the relevant text to: “It should be noted that the Saito

et al. measurements are reported on a volume mixing ratio scale, although any correction for non-ideal gas behaviour is likely to be quite small and will not account for the observed difference in growth rates.”

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19089, 2011.

ACPD

11, C11268–C11271,

2011

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C11271