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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Fractional release factors of long-lived halogenated organic compounds in the tropical stratosphere" *by* J. C. Laube et al.

Anonymous Referee #1

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The authors present results from a unique data set collected by whole air samplers (WAS) on high altitude aircraft and balloon platforms in the tropics and mid latitudes. Fractional release factors (FRFs) of organic trace gases were determined from measurements of the respective mixing ratios, age of air calculations from measurements of SF6, and tropospheric trends for each trace gas. As the authors point out, refinement of previously calculated FRFs is an important step in refinement of ozone depletion potential (ODP) and global warming potential (GWP) calculations for the various trace gases. ODP and GWP values are taken into consideration by policy makers in determining production and emission regulations. They are also used to estimate future changes in stratospheric ozone and the radiation budget. This work makes a significant contribution to refinement of FRFs.

General comment: the authors should be consistent in the use of CFC and HCFC rather than F, e.g. CFC 11 instead of F11 and HCFC 22 instead of F22.

Comments: Introduction: p. 20285, line 7, FRF represents the inorganic halogen fraction released assuming that the difference between the entry mixing ratio and measured mixing ratio is all in the inorganic form. This is generally assumed but it would be good to state it.

Calculation of fractional release factors and error bars: Given that the formulas for calculating FRFs are not widely used in the community, it would be helpful to include the formulas that were used by the authors.

p. 20289, line 12-13, listing the source of information in the Tables after the references was somewhat confusing. The authors should consider including the source with the reference, e.g. Table 1-1 of Montzka and Fraser, 2003 (AGAGE, in situ data...), and Table 1-2 of Clerbaux and Cunnold...

p. 20290, line 7, what does "sample instability errors" mean?

Results and Discussion: p. 20291, lines 5-7, I don't understand this sentence, e.g. air masses that have experienced similar transport pathways show different correlations. It's certainly true that the correlations are different for different latitudes in the stratosphere, but the transport pathways are not the same.

p. 20291, lines 15-24, The point should be made in this section that the vertical distribution of loss for each compound whose loss is primarily by absorption of radiation varies with latitude, e.g. loss rates in the tropics are larger at a given altitude than at mid latitudes because of the enhanced radiation. For gases with primarily an OH loss, e.g. HCFC 22, the vertical distribution of loss is less variable with latitude because the distribution of OH is less variable.

p. 20292, line 15, This sentence was a bit confusing. The authors should consider the following..."Therefore the derived tropical correlation functions of FRFs vs mean age

can be used for a wider temporal range than mixing ratio correlation functions and are valid. . .

p. 20293, lines 4-8, The difference for CFC 114 between this work and Schauffler et al, 2003 is interesting, especially given the similarities for the other gases. It is something that requires further work to determine the cause.

Table 1 caption, what criteria were used to assign samples as “uncontaminated” samples?

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 20283, 2009.