

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

Anonymous Referee #2

Received and published: 2 December 2009

1 General comments

Laube et al. present a new data set of 15 long-lived halocarbons for the tropical stratosphere. This data set is unique in its completeness and by itself worth for publication. The authors enhance the value of the data set by deriving fractional release factors as a function of mean age which minimises in a first order sense effects resulting from the specific measurement location and date. Therefore this data set will be welcomed by modellers when validating their models.

Nevertheless, there some limitations of the study which should be discussed in more details by the authors. The authors point out that FRFs deduced so far haven't included observations from the tropics, and that here the widely used FRFs cannot be

used according to their observations. But the data which are used to deduce the new tropical FRF(mean age) functions originate essentially just from two tropical balloon flights taken 17 days apart and at the same location, as the Geophysica don't reach into the tropical stratosphere. At least one would expect the QBO phase to influence the result and the authors should therefore discuss how representative the data set is or how strong for example QBO could modulate the functions.

The method applied for calculating FRFs is not fully described in the current paper. The reader has to refer to the literature in order to compare the method used here with methods used by other authors. Perhaps this part could be given more attention by the authors in a revised version.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

2 Specific comments

Page	Line	Item	Comment
20284	11	imprecise	imprecise could be understood as following from instrumental errors etc.
	9ff	Moreover ...	These statements are too strong in my opinion. ODP and FRFs are used typically as an approximate representation of ozone photochemistry.
	15	enhance	it's not the halocarbon itself which take part in catalytic cycles
	15	paragraph	The argument is too general. The paragraph can be combined with the following one and formulated in a more concise way.
	21	very few, ff.	This is not true when taking into account the great number of satellite observations by HALOE, MIPAS, CRISTA etc.. Even the number of different CFCs observed by the satellites is not really small. The special advantage of the in-situ WAS observations (much more completeness, high precision, vertical resolution) should be pointed out, but in view of their limited coverage in space and time.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Interactive
Comment

Page	Line	Item	Comment
20285	6ff	paragraph	the equation and definition should be given first. The FRFs should be put in the context of ODP and GWP estimation here, see first paragraph on page 20287.
20287	9	These FRFs ...	Please specify how this can be accomplished
	12	parameter-ization	what do you mean by parameterization of CTMs, and how can CTMs predict future ozone??
20288	12	The whole air	do you mean „all“ samples from both platforms?
	18	procedure	Can you specify the differences to Schauffler and how this could influence the results? The cited references give the impression that Engel et al. is not the whole story. As I understand you apply the age spectrum according Engel et al. and the entry mixing ratios according Laube. Perhaps a simple formula would help to clarify.
	18	analysis	Age spectra as derived by empirical studies or by model studies may include some contribution stemming not from irreversible mixing processes but from averaging over air masses of different characteristic. In your sample the tropical balloon flights are the ones where the difference between tropics and mid latitudes is most pronounced (as expected). One may ask how representative these two data sets for the tropical stratosphere are on a global scale.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Page	Line	Item	Comment
	22	SF6 analysis	could/should be part of the section analysis. What about the error of mean age? Is it assumed to be zero and therefore no error bar is shown for mean age in the figures? Does the fitting procedure include the error of mean age?
20290	6ff	error analysis	Could you give some idea what the main contributions to the errors are?
	16	But transport ...	The different correlations are caused by the different photochemical „dose“ air parcels experience on different paths through the stratosphere even having the same transit time. Just the existence of transport barriers or the fact that air parcels experience chemistry is not sufficient to explain the differences.
	23	The correlation	What about the QBO? Schoeberl et al., JGR 2008, have analysed QBO amplitude for various substances. As for N ₂ O, also for the shorter lived CFCs QBO would influence transport and to some extent the correlation. The data set presented spans only a small part of the qbo cycle and could therefore include some systematic deviation.
20291	26	polynomials	First, it would be helpful to state also in the text, and not just in the table caption, that the fit functions were derived using data between 22s and 22N only. Second, it is worth to mention (and to explain) that through the fit procedure negative and meaningless FRFs are produced.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Page	Line	Item	Comment
20292	4	agreement	Inspecting the correlations, data of the Geophysica flights at mean age > 1.5 a obviously are not belonging to the tropical domain. It may be better to leave these data completely out for constructing the correlations.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

3 Technical corrections

Page	Line	Item	Change To/ Comment
20284	3	influence	go into
	6	measurements on	measurements of
	7	transit times	transit time etc.
	10	revealed	reveal
	17	radiative balance	radiative balance depends on
20285	18	could be	are
	10	reference	should be given to Solomon and Albritton here too.
20286	10	probability distribution function	probability density function
	21	distribution	concentration as a function of time
20287	3ff	measures	indices
20288	1	volume	volume each
	12	Frankfurt	specify lab or say within your group
20294	13	correlation	you derive FRF(mean age) from correlations
20301	H-2402	error = 0.00	correct?
Fig. 4	caption		as in Fig. 5+6 start with F113

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

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

