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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Rapid growth of HFC-227ea (1,1,1,2,3,3,3-Heptafluoropropane) in the atmosphere" *by* J. C. Laube et al.

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General comments

Title: A rapid growth is a very nice and glossy title. But in principle every compound that has been introduced anthropogenically will grow rapidly from nothing. So I strongly suggest that authors revise the title to something more scientifically. A suggestion would be Trend of atmospheric HFC-227ea derived from firn air and high altitude samples. This brings me to the second major point. Throughout the manuscript authors speak of remote regions of the atmosphere or background atmosphere. Although this is in a wider sense true, I would strongly suggest changing this and say firn air samples and high-altitude samples. Background implies sampling in more than these rather specific parts of the environment (e.g. also on the ground in the Southern hemisphere).

Author response

The title was changed to "Accelerating growth of HFC-227ea. . .". As for the second major comment, we would like to point out first, that we speak only of "remote regions" but do not use the phrase "background atmosphere". Secondly, "remote regions" is only used twice with respect to our observations – in the abstract and in the conclusions. To be more specific, the phrase in the abstract was altered to "in air samples originating from remote regions" and the one in the conclusions to "in remote regions of the atmosphere (i.e. in firn air and high-altitude samples)". Nevertheless it is in our opinion appropriate to speak of "remote regions" as we do not claim to cover all of these regions. However, a sentence in the conclusions was expanded to further highlight the importance of the need for more observations: "Further studies, which should include observations from global ground-based networks, are needed to improve the understanding of the emission processes and patterns and the global distribution of HFC-227ea."

Technical comments

Referee comments

P7677 L.5 : : :in the current northern: : :

P7677 L. 17 for the anthropogenic stratospheric: : :?

P7678 L. 6ff I would strongly recommend using data from Forster et al., 2007, which are: Lifetime 34.2 and GWP 100=3220, as these are the latest publicly available data.

P7863 L1ff Following the online discussion about usage of different types of Arrhenius equations I don't see the point in using the more complicated one just for the sake of the argument. Therefore, I strongly suggest to use the more straightforward expression, as suggested by S. O'Doherty in his comment on March 29.

Fig.1 If authors would invert the x-axis of the upper figure it would be easier for the reader to compare both figures at one glance. Furthermore, it would be illustrative if

you include data points from the firn air samples into the lower panel. This would allow the reader to evaluate the quality of the model.

Author response

Changes were applied as requested.

Referee comment

P7677 L. 22 missing here are the publications for HFC-134a and HFC-125 (O'Doherty: : :) and HFC-152a (Greally). Perhaps you could just mention Clerbaux and Cunnold 2007 here to make it shorter.

Author response

The three missing references were inserted.

Referee comment

P7678 L.10 EDGAR project team? I am sure there is a more official way of citing EDGAR

Author response

The reference was changed to EDGAR, 2009

Referee comment

P7678 L. 11 also here the remote atmosphere should be replaced as indicated above.

Author response

We do not agree with the referee here as it is in our opinion appropriate to say, that the detection of HFC-227ea in the remote atmosphere has been missing so far.

Referee comment

P7680 L1: It would be essential to know what has been the final precision of the

standard and what its actual concentration was when it was used to measure the atmospheric samples.

Author response

A sentence was added, which provides the requested information: "The air standard used to assign mixing ratios to the samples was found to contain 0.354 ppt HFC-227ea and showed an average 1σ measurement precision of 1.4 %.

Referee comment

P7680 L.2ff Details of the identification could possibly be shifted to the supplement.

P7866 L19. The dilution system has not been a central issue in the rest of the paper, so it should no be mentioned here.

Author response

The first observation of this compound in the atmosphere is one of the key messages. Therefore we feel that the confirmation of its detection is essential to the manuscript and should not go into the supplement. One could argue that the calibration is essential, too. Thus we added a brief summary of it to this section.

Referee comment(s) P7862 L5 Where has this sample been measured?

Author response All samples were measured at UEA using the same analytical system i.e. the one described in the "Experimental methods" section.

Referee comment

P7862 L24. How is this 6% justified? Any other similar compounds?

Author response

The number originated from halon distributions. It was changed to 2 %, which is the distribution given in the EDGAR (2009) database. All consequent changes in emissions were within the given error bars.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 7675, 2010.