

## ***Interactive comment on “Recent increases in the atmospheric growth rate and emissions of HFC-23 (CHF<sub>3</sub>) and the link to HCFC-22 (CHClF<sub>2</sub>) production” by Peter G. Simmonds et al.***

**Anonymous Referee #2**

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This manuscript reports an update of the evolution of global mole fractions and emissions of HFC-23, an important greenhouse gas. The findings are novel and interesting and the overall work is certainly of sufficient quality for publication in ACP. I would however suggest a) clarifying the reasons for publishing this gas separately from the 2017 Simmonds paper on HFCs and HCFCs and b) the following changes:

L33-36 I'm not sure what the authors want to say here. Does this mean that the HCFC-22 production process has been releasing an increasingly high fraction of HFC-23 or are other sources important, too? This should be clarified in a concise way.

L47-49 So which regions are likely to be responsible for the other 98.5 %?

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L53-58 This sentence is very long. Consider splitting it up to improve readability.

L75 The date of that reference is inconsistent with the one in the reference list.

L75-91 This section is a rather abrupt change from the previous and could benefit from short introductory sentence or sub-heading. I would also suggest moving to after the next paragraph.

L88-91 I'm not sure why the extra details are relevant. Surprisingly, the reference to Simmonds et al., 2017, who reported HCFC-22 observations and emissions from the same network (and repeatedly discussed HFC-23), is missing, as are any other papers on HCFC-22.

L126-169 There are quite a lot of technical details in this section, which do not contribute to the main messages of the paper. These methods are also well established and I suggest moving large parts of the section to the supplement to improve readability.

L203 I would be interested to know the methodology used to calculate this “liberal estimate”. Is there a reference and could more information specifically on HFC-23 and HCFC-22 be given in the supplement?

L277 The annual growth probably relates to all of 2016, not just the end of that year?

L293-296 The authors should make it clear that they have already published the HCFC-22 data they refer to here.

L314-316 It is not clear whether this agrees with Carpenter and Reimann (2014) or not.

L469 Please correct: un-abated.

L779-781 As published in Simmonds et al., 2017?

L800-816 Missing from the two figures is previously published data and the respective sections of the manuscript would also benefit from a discussion of how mole fractions

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compare with published data. The axes on the inset of the first figure are very hard to read and the firn air is missing from the legend.

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