

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-298

Anonymous Referee #1

Referee comment on "A renewed rise in global HCFC-141b emissions between 2017–2021"
by Luke M. Western et al., Atmos. Chem. Phys. Discuss.,
<https://doi.org/10.5194/acp-2022-298-RC1>, 2022

The authors discuss the recent increase in emissions of HCFC-141b derived from observed atmospheric mole fractions by two measurement networks. They discuss reasons of this increase, but can not find a clear source. Several potential sources are discussed and mostly excluded. The paper is well written and scientifically sounds. Well founded measurements and inversion methods are presented and discussed with a solid uncertainty analyses.

Specifics comments:

L11: The word "Therefore" does not following logically from the previous sentences. I suggest to rephrase the sentence or simply omit the word.

L74: Remove the first occurrence of "not" in the sentence.

L140-144: Emission release fractions are determined using a statistical approach. Can you explain how you distinguish between A5 and nonA5 countries? It says "as these measurements predate the non-negligible global consumption". Does that mean that release fractions for nonA5 are determined mostly from the period 1990-2000 and for A5 after about 2010? Also, you assume that the release fractions are constant in time. This seems valid for the 'regular' use of HCFC-141b, but what if there is illegal production, use, or disposal? Please discuss this, maybe around lines L312-313..

L286-287: The hemispheric differences increases from 2018 to 2021. The low hemispheric difference is only seen for 2018, a single year (what I deduce from Fig 3). With a decrease in use and emissions you would expect the hemispheric difference to become smaller, but since it is now only seen in one year, I doubt it is a valid/strong argument. Please say something about this.

P12: Caption Fig 4: From the caption it now seems that the left panel shows the consumption data and not emissions estimated from consumption data. I think you can solve this by writing "..., and from reported consumption data ...".

L330: The disposal could on average be 15 years after peak in consumption, but it will be a rather broad peak, I assume. I would mention this, since it may be a reason why an increase in HCFC-141b emissions started in 2018 (and not in 2026).

L338-340: I would rephrase this sentence. Something like, "A universal leakage rate of 20% in 2020, compared to 0.1% in 2017 would be needed to explain the observed global increase in emissions ...".

L352-354 and L357-359: The emissions from eastern China, scaled down from the whole of China, from Fang et al. (2018) show an increase (Fig 5), but the emissions from the whole of China from Fang et al. (2019) show a decrease? This seems inconsistent? Is there separate information for the rest of China that shows an increase?

L357: Please give a reference for the "Act on Rational use ...".

L416-418: I suggest you mention here that the increase in Chinese CFC-11 emissions could only explain 40-60% of the global increase. This would support the idea that the extra emissions in part originate from regions not monitored. This connect to the statement in L440-442.