

Response to reviewers' comments on the manuscript "New and improved infrared absorption cross sections for chlorodifluoromethane (HCFC-22)" by Jeremy J. Harrison.

I thank the reviewers for their comments. These comments are reproduced below in bold text, followed by my response.

Reviewer #1:

When corrections asked in the interactive process have been made, I recommend the publication of this paper perfectly suited for AMT topics. The Research on HCFC-22 is especially useful for the present and for the future of environmental studies. Moreover this paper is well written and presented.

I thank the reviewer for these positive comments.

Reviewer #2:

The manuscript presents mid-IR absorption cross-sections of HCFC-22, the most abundant HCFC in the atmosphere. It is a well-structured and complete paper relevant to the atmospheric community. I recommend this manuscript for publication after a few minor corrections.

I thank the reviewer for these positive comments.

Line 7-8: The title may be polished. The adjectives "new and improved" do not provide useful information.

I do not agree with this comment. This work presents *new* cross sections which *improve* upon previous cross-section datasets.

Line 151: Define PT as "Pressure-Temperature".

PT was earlier defined on line 114.

Line 240: Precise that the systematic error of 1.5% (1 σ) is the error on the integrated band strength from this work and not the PNNL error.

As explained in the text, the intensities of the new cross sections have been calibrated against the PNNL integrated band strength. The value of 1.5% is the uncertainty in the PNNL integrated band strength, and needs to be included in the total uncertainty budget.

Line 243: "but in reality is likely closer to 0.0001 cm⁻¹". Could that assumption be developed/explained?

HITRAN error codes indicate that these N₂O line positions are accurate to between 0.001 and 0.0001 cm⁻¹. However, these line positions themselves are given to 5 decimal places in the HITRAN linelist, which suggests to me that the accuracy is closer to 0.0001 cm⁻¹.

Line 262: The calculated value for the systematic error contribution does not fit equation 3. The author should also precise if his final error is at 1 σ or 2 σ .

This has been checked, and the systematic error contribution does indeed fit Eq. 3; note that values have been rounded up to the nearest whole number (3 %).

The error is 1 σ ; this point will be reinforced in the manuscript text.

Line 268-270: This point is irrelevant without better supporting evidence.

This point will be removed.

Line 300: Avoid colloquialism. The standard deviation of Varanasi integrated band strengths versus the one from this work would be more useful.

There is no colloquialism here.

In my view the plot in Figure 2 provides a better comparison than simply listing standard deviations. The plot also displays the discrepancy in integrated band strength (ν_3 / ν_8 bands) below 250 K, indicating problems with the Varanasi cross sections.

Line 342: Once again, the author must precise if the error is at 1 nsigma or 2nsigma.

As before, the error is 1σ .

Figure 1: The details of the bands are difficult to see at this scale. A focus on the most important areas would increase the pertinence of the plot.

The fine structure is not meant to be directly observed on this scale. The figure simply provides an overview of the different bands featured in this work.