

## ***Interactive comment on “The influence of instrumental line shape degradation on NDACC gas retrievals” by Youwen Sun et al.***

**Anonymous Referee #1**

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General comments:

The authors present a study on the influence of instrumental line shape (ILS) degradation on NDACC gas retrieval. Although this topic has been discussed in several NDACC infrared working group (IRWG) meetings in the past there is not so much in the literature, except for a few species such as ozone or water vapor. This paper describes this topic in detail for all the ten species which are mandatory to retrieve and for which a harmonized data analysis scheme is established within the IRWG.

Since it is well written and gives a comprehensive presentation of the influence of an imperfect ILS I recommend publishing this paper. This paper fits in the scope of AMT and will be useful for the IRWG.

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Specific comments:

- Chapter 4.3 and Table 4: Channeling error is not included in the error analysis. At least for a weak absorber such as ClONO<sub>2</sub> this error source is not negligible.

- While Haidinger fringes are presented for scenarios in Figs. 11 & 13 Haidinger fringes are missing for those in Fig. 1.

- The conclusion (as well as in the abstract) ‘For total column retrieval, the stratospheric gases are more sensitive to instrumental line shape degradation than the tropospheric gases.’ is a bit qualitative. I would suggest to add some numbers: For typical misalignment scenarios the column of O<sub>3</sub>, HCl, HF and ClONO<sub>2</sub> changed by 3, 6, 5 and 35%, respectively.

- Table 5 nicely summarizes the recommendations for ME. I would suggest to add a sentence to the end of the abstract and the conclusion summarizing this result: ‘For the retrieval of NDACC standard stratospheric species a ME within  $\pm 5\%$  is required. Therefore, the alignment of an NDACC instrument needs to be better than 5% in terms of ME’ or something similar.

Technical corrections:

- p. 5, line 139: increasing misalignment with increasing opd

- Legend of Figs. 5&6 and x axis description in Fig. 9 are hard to read (at least in my hardcopy).

- Figs.: ‘l’ in small letter in HCl and ClONO<sub>2</sub>

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