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.

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 ClONO2 this error source is not negligible.

Response: The selection of error items and their values cannot be easily standardised because most of them are instrument/site dependent. In this paper, we already included most common error items in the error analysis. The channeling error was not included because: 1, it is instrument dependent and it is not a common error, some instrument may have very weak channeling effect; 2, The main point of this paper is the same regardless of including or not including channeling error. This is because error analysis is the post processing (last step) of NDACC retrieval, how many errors to be included may have influence on the total error and thus the fractional difference of statistic errors, but have no influence on the total column, DOFs and profile which are obtained before post processing step.

Related change: None

- While Haidinger fringes are presented for scenarios in Figs. 11 & 13 Haidinger

fringes are missing for those in Fig. 1.

Response: We have included Haidinger fringes for those in Fig.1.

Related change: In the revised paper, Fig.2 showing Haidinger fringes for those in Fig.1 is included.

- 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 O3, HCl, HF and ClONO2 changed by 3, 6, 5 and 35%, respectively.

Response: We have improved this description as your suggestion.

Related change: A quantitative description "For a typical ILS degradation (10%), the total columns of stratospheric gases O_3, HNO_3, HCl, HF, and $ClONO_2$ changed by 1.9%, 0.7%, 4%, 3%, and 23%, respectively. While the columns of tropospheric gases CH_4, CO, N_2O, C_2H_6, and HCN changed by 0.04%, 2.1%, 0.2%, 1.1%, and 0.75%, respectively." have been included in both abstract and conclusion. Please check the conclusion and abstract sections for details.

- 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 +-5% is required. Therefore, the alignment of an NDACC instrument needs to be better than 5% in terms of ME' or something similar.

Response: We have added some sentences to summarize Table 4 (i.e., Table 5 in the previous version).

Related change: Some sentences to summarize Table 4 (Table 5 in the previous version) are added, please check section 6 for details.

Technical corrections:

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

Response: We have revised this sentence as your suggestion.

Related change: Now it is "Typically, the increasing misalignment with increasing OPD (b, f, h or i) causes negative ME amplitude and the decreasing misalignment

with increasing OPD (e, g or j) causes positive ME amplitude."

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

Response: In order to make the content more concise on the main point of this paper and catch attention to the influence of ILS on the retrieval of gases, following referee #2' suggestion, we have removed Figs. 5&6 which contribute trivial to the main point of this paper. We have updated Fig.9, now x axis description is very clear.

Related change: We removed Figs. 5&6 and updated the x axis of Fig.9.

- Figs.: 'l' in small letter in HCl and ClONO2

Response: All "HCL" and "CLONO$_2$" in this paper have been changed to "HCl" and "ClONO$_2$", respectively.

Related change: We have revised all "HCL" and "CLONO$_2$" as "HCl" and "ClONO$_2$", respectively.