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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterisation and potential for reducing optical resonances in FTIR spectrometers of the Network for the Detection of Atmospheric Composition Change (NDACC)" *by* Thomas Blumenstock et al.

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I wish to congratulate the authors on this well researched and well carried out scientific work.

The manuscript is well and clearly structured, concise, relevant, appropriately illustrated, easy to follow and demonstrates a very good command of the English language. A pleasure to read.

The work presented fits well within the scope of this journal. The work exposes, de-

scribes and resolves one of those nagging problems that have been a stone in the shoe of many researchers in this specialist field. The novelty and relevance lies primarily in discussing the issues caused by undesired optical resonances not from the perspective of an individual instrument but on a measurement network wide concise analysis and quantification of the variability and amplitude of these issues and how relevant these are to the overall error budget of trace gases reported by the NDACC (and TCCON) network. The authors include the principal manufacturer of the commonly used spectrometers (Bruker Optics) in the study. This is a good approach and a reflection of decades of good dialogue between cutting edge research and industry to mutual benefit. The authors also discuss and suggest practical technical solutions to the benefit of all affected.

The scientific work has been carried out diligently and the conclusions are sound and relevant. Proper credit is given to past investigations as well as the contributing community who are seemingly all included as co-authors. Abstract and title are appropriate and concise.

Below I have a short list of very minor comments and suggestions that the authors may wish to consider for the final version to improve clarity and readability, but it is nothing that should delay the publication of the final version even if left unconsidered.

- Page 3, section 2, Line 91 "Equation (1) is used to assign..." replace 'assign' with 'identify'

- Line 94 correct spelling is "a harmonic" (not an harmonic)

- Line 104, description of Figure 1: Consider adding "where 'l' is denoted 'd' in equation (1)"

- Line 137 " Then, the background was normalized and a straight line was subtracted using OriginTM software" How was the normalization carried out? Or did the authors mean to say ' Then, the background was normalized by subtracting a straight line (from

the laboratory spectra) using OriginTM software'?

- page 14, section 5, Line 235 Comment: I wouldn't stress this as an impediment. As long as no pellicle beam splitters are in use, and which seems to be the case for the NDACC (and I believe the TCCON as well) which are the focus of this study, there is no issue as long as the only or at best two beam splitters in use for a given instrument have the same air gap wedge of say 2 degrees. I'm not sure if an additional glass beam splitter is in use for the optical alignment of the FTS, in which case the same wedge would have to be used for that one, too.

- Line 238: "Such a systematic performance analysis is needed for improving the trace gas retrievals and for calculating complete error budgets." Comment: consider adding "also in order to improve the consistency and quality of the products across the NDACC network"

- Line 242 Comment: Perhaps a rough indication of typical relative absorption strengths of the weak absorbers listed by the authors would be helpful to put the channeling error amplitudes reported into perspective, possibly earlier in the discussion rather than here.

- Line 249 Consider replacing "leading one" with "dominating one" Given that Axel and Denis from Bruker Optics are among the co-authors it would be nice to have and indication (or ideally commitment) that beam splitters with a larger air gap of say 2 degrees are available as an option - if necessary at a small surcharge - for new orders or a modification service for existing beam splitters. That would be great to know even for users outside the NDACC community that may also be affected by channeling in their work.

Recalling a quote from the late Rodolphe "Rudy" Zander: "Bruker as a manufacturer may not be better or worse than other companies, but at least they are listening". I hope that this good spirit continues beyond the retirement of Axel who has been the link to the NDACC community for decades.

Thanks to all authors and contributors to this enlightening study.

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