

Interactive comment on “Improved instrumental line shape monitoring for the ground-based, high-resolution FTIR spectrometers of the NDACC” by F. Hase

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Received and published: 18 January 2012

First of all, I would like to thank D. Feist and Referee #2 for their appreciated comments, as well as for pointing out some phrasing issues and typos. I will take these corrections into account in the revision of the manuscript.

Since both D. Feist and Referee #2 address the relation of the current publication to TCCON NIR measurements I would like to take the opportunity to comment on this: Although the methodology applied in both networks is rather similar, the practical aspects of ILS characterisation developed in the paper under consideration are not trans-

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ferable to the TCCON network in a straightforward manner. The main reason is that the absorption bands are much weaker in the NIR, so the recipe developed here and suggested for application within the NDACC (and the selection of N₂O) is not easily transferable to TCCON. Simple cells would attain impracticable length to be used at all TCCON sites. I would agree to include a discussion of the TCCON case within the current paper if a minor modification of the recipe would satisfy TCCON needs, but I am not aware of such a simple transfer. Therefore, in my opinion, the current paper is a self-contained piece of scientific work mainly addressing the NDACC community. (It was a major effort to define suitable cell parameters, to produce the various cells involved and to investigate the performance of the method in comparison to the standard HBr cell.) I included TCCON in some parts of the discussion because the effects of an insufficient ILS characterisation are so similar in both the MIR and NIR spectral domains, and the physical effects which cause misalignment are the same (as the same type of FTIR spectrometer is applied). Finally, I mentioned TCCON in the outlook section to communicate to the TCCON community that I am aware of the need to further improve the ILS determination in the NIR, but it still will be a non-negligible effort to develop a practicable solution for this problem, not just a minor modification of cell parameters. I will address the TCCON needs in the next step, but cannot give a detailed outline here, as development work of considerable amount is still ahead. (The aforementioned implicates the answer to D. Feist concerning the applicability of N₂O for TCCON-only spectrometers: unfortunately, N₂O does not provide suitable bands in the NIR.)

I do not fully share the opinion of Referee #2 that the ILS characterisation is a more important topic for TCCON than for NDACC. The FTIR community within the NDACC has widened its scope in recent years, currently not only stratospheric or tropospheric gases of strong variability are the target observables, but retrieval studies addressing greenhouse gases and isotopic variability are undertaken within the NDACC, imposing similar challenging requirements with respect to instrumental characterisation as for TCCON.

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Furthermore, I do not see why the publication should be postponed to await the results from a longer time sequence of ILS measurements. The set of measurements and analysis results provided in the paper seem sufficient to me in indicating the superiority of the proposed method beyond any reasonable doubt. What can we hope to add to this picture by following ILS variations over a longer time span? We know that the ILS is a slowly varying function as we monitor the ILS using different gas cells at several FTIR sites since many years. The proposed method will simply enable us to follow these variations with improved sensitivity, to check the quality of the ILS reconstruction and will provide a superior transfer standard between different spectrometers.

Concerning the safety issues of different gases raised by D. Feist: N₂O is much less problematic than are HBr and HCl. According to Linde Canada, it is classified as (notifiable) allowed substance for air transport. I do not expect problems concerning air transport of the cells given the tiny N₂O amounts contained, for further details see (www.lindecandada.com/en/msds/linde/Nitrous__Oxide_EN.pdf).

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 7699, 2011.

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