Atmos. Chem. Phys. Discuss., 8, S1859–S1861, 2008
www.atmos-chem-phys-discuss.net/8/S1859/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simultaneous atmospheric measurements using two Fourier transforminfrared spectrometers at the Polar Environment Atmospheric ResearchLaboratory during spring 2006, and comparisons with the AtmosphericChemistry Experiment-Fourier Transform Spectrometer" *by* et al.

F. Hase (Referee)

frank.hase@imk.fzk.de

Received and published: 22 April 2008

General comments:

The paper deals with partial column measurements of stratospheric trace species. It is very readable and well structured. The applied methodologies are properly described

and the results are generated in a competent manner from the available observational material. I support to publish the paper in ACP. However, I suggest to clarify and strengthen the focus of the work.

Specific Comments:

The paper presents a collection of several subtopics:

* A side-by-side intercomparison of two ground-based FTIR spectrometers within the 2006 Canadian Arctic ACE validation campaign held in Eureka is presented, addressing several stratospheric trace species.

* Next, the measurements are exploited for the validation of ACE-FTS ver. 2.2 data.

* Finally, the trace-gas evolution during the campaign is discussed.

A somewhat weak point of the paper is that a clearly defined focus is not apparent: In the introduction it is said "..., it is nessessary to understand the difference between ground-based instruments that are used in satellite validation studies and this is the focus of this paper." According to the title, the validation of the ACE-FTS seems to be of equal importance. Judging from the length of Sections 5.1 and 5.2 the first two topics listed above seem to be of about equal importance, the third topic (Section 5.3) proves to be a supplement of lower importance.

In my feeling, the intercomparison of the two ground-based instruments is not the main focus of the paper, it is more an - however important and valuable - prerequisite for the ACE-FTS validation. The excellent level of agreement as documented in Table 3 strengthens our confidence that both instruments are well maintained and that the applied analysis procedures work properly (giving compatible answers for instruments which differ considerably in spectral resolution). However, if the understanding of the difference between ground-based instruments is intended to be the main focus of the paper, then the reader should expect an even deeper investigation of the remaining discrepancies, beyond their quantification and a plot of the total column sensitivities.

ACPD

8, S1859–S1861, 2008

Such an investigation should quantify the effects of expected atmospheric variability, individual instrumental error budgets, statistical confidence limits of the ensemble, etc.

With respect to Section 5.3: I'm not sure whether the paper gains much out of this discussion (if we regard it as an instrument intercomarison and / or ACE-FTS validation paper). Concerning the arctic chemical vortex evolution in 2006, the authors refer to MLS and ACE-FTS observations as well as SLIMCAT-model studies. Do the ground-based observations presented here add new aspects to these probably more comprehensive investigations? Although a description of the dynamical and chemical vortex evolution during the campaign period is fully appropriate in the context of validation, it might be sufficient to present this in a more concise manner before the results of the validation are discussed. If the authors wish to treat the topic of chemical evolution in its own right, Section 5.3 should be extended and model results should be included.

Technical corrections:

Given the limited number of measurements, it is probably generally sufficient to specify percentage differences to one decimal place in the text.

Page 5314: Are you sure about the cell pressure? 14.7 hPa is quite high. I expect that the resulting linewidth will compromise the ILS inversion at least in case of the DA8.

Page 5318: In ground-based solar absorption geometry, there is no tangent point.

Page 5328: When ground-based and ACE-FTS NO2 and NO measurements are discussed, is a box model correction included as has been exercised in Kerzenmacher et al?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 5305, 2008.