

Interactive comment on “Characteristics and error estimations of stratospheric ozone and ozone-related species over Poker Flat (65° N, 147° W), Alaska observed by a ground-based FTIR spectrometer from 2001 to 2003” by A. Kagawa et al.

Anonymous Referee #3

Received and published: 3 November 2006

General comments:

The authors present a time series of trace gases observed by ground-based FTIR at Alaska. A detailed error analysis is given. Data have been compared with correlative measurements from Brewer, ozone sondes, TOMS and HALOE satellite sensors. The paper is well written. The subject is fully appropriate to ACP. I would recommend to publish it after revision.

While the results are compared with respect to the paper of Barret et al. a major topic of this paper has not been considered. Barret et al. used a wide microwindow at 1000 cm⁻¹ to improve the sensitivity and vertical resolution in the troposphere. This reduces the influence of a priori data. It may improve the agreement with other tropospheric data also in this study. Furthermore, a comparison with Schneider et al (ACP, 2005, JQSRT 2005) is missing.

Cell measurements to derive the ILS are mentioned. But ILS results are not presented. Furthermore, it is not clear whether these results have been used for the analysis of atmospheric spectra.

Data presented are limited to the period of 2001 to 2003. Observations made before and after this period are not included in this study without giving any reason. Discussion of atmospheric topics is quite limited. Maybe it is beyond the scope of this paper. However, a more detailed discussion with respect to the position of the vortex would be also helpful when comparing results with other data sets. Using the presented time series of HF or that of the ratio of HCl to HF might give a hint whether polar air masses have been sampled occasionally.

Specific comments:

P. 10302 + 10317: "Poker Flat is located between the Arctic region and mid-latitudes. Because it is outside the polar vortex for most of the winter and spring,": On the other hand CO enhancements due to polar intrusions from the mesosphere have been observed in late winter (Kasai et al, 2005). Is polar vortex air sampled by any of the data points presented in the study? Are PV data or PV differences checked for the comparison with other instruments?

P. 10302: "have been validated with Improved Limb Atmospheric Spectrometer (ILAS) II 15 Data": Better use 'compared with' or 'ILAS data have been validated by FTIR'?

P. 10303+ 10316: "for 2001, 2002, and 2003, respectively (see Table 2)": Why are

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observation made before (starting in 1999) and after this period not included in this paper?

P. 10303: Are detector non-linearities (mainly from MCT detector) considered in the data analysis?

Table 1: Not important, but I'm wondering a bit about the numbering of NDSC filters: Why don't you use #1 for the first one and #2 and #3 for the next ones instead of #2, #3 and #3.5?

P. 10305: "We used the frequency region of 3051cm⁻¹ for ozone": For Ozone several microwindows are suitable which might be fitted simultaneously. In particular, a wide microwindow around 1000 cm⁻¹ as proposed by B. Barret improves the vertical resolution significantly, in particular for lower altitudes.

P. 10305: "The instrument line shape (ILS) function was obtained from retrieval using spectrum of HBr cell measurement": What are the results from these cell measurements? Are these results used in the retrieval of profiles? EAP (Effective Apodization Parameter) is discussed in the error analysis but not here (retrieval analysis). Is EAP fitted when retrieving profiles or is it fixed?

P. 10305: "Monthly profiles of ozone ..." have been used: Did you check the influence of changing a-priori on the time series, in particular on the seasonal variation?

P. 10306: A vertical grid of 2 km is quite coarse in the troposphere.

P. 10307 + 10312: "The values are comparable with Barret et al.": For Ozone a better vertical resolution has been achieved in Barret et al. using additional microwindow. See also comment above. The influence of the HALOE climatological profiles would be smaller (p. 10312).

Chapter 5.3. A detailed error analysis and a comparison with Barret et al is given. A comparison with Schneider et al (ACP, 2005, JQSRT 2005) is missing.

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P. 10312: Differences of 50% to sonde data as found in the troposphere are quite large and are larger than those reported by Barret et al. or by Schneider et al.

P. 10315: "Overall, the gb-FTS O₃, HCl, and HF stratospheric columns are well correlated": Is a correlation coefficient of 0.54 or 0.65 sufficient for this statement?

Figs. 1 + 9 are quite small.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 10299, 2006.

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