**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "First carbon dioxide atmospheric vertical profiles retrieved from space observation using ACE-FTS solar occultation instrument" *by* P. Y. Foucher et al.

Anonymous Referee #2

Received and published: 26 January 2011

General comments

This paper shows the results from the Foucher et al. method of retrieving CO_2 profiles in the mid-to-upper troposphere and stratosphere from the ACE-FTS measurements. This work is suitable for publication in ACP if the figures are made clearer, Referee #2's concerns are addressed, and other minor changes are considered.

1. These are not the first CO_2 vertical profiles retrieved from the ACE-FTS and hence the title and sections of the text should be modified accordingly.

2. Errors should be quoted, in the form of error bars on all plots, and in the form of $\pm$ in the text (e.g. $1.9 \pm$? ppm/yr).

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3. Figures are generally confusing. Multi-panel figures are not particularly easy to read. I would suggest condensing and clarifying the information in the plots. For example, Figure 3, if it's necessary at all, could be plotted on one set of axes, with a different coloured line for each month, and a horizontal line at 20 showing the values which are significant (according to P26479L20).

Specific comments

1. P26475L24. TES should be mentioned in the introduction, as it also retrieves mid-tropospheric CO2 in the thermal infrared.

2. P26479L4. Does the criterion of a lowest tangent altitude <12 km give a significant sunset bias?

3. P26482L7. This would be clearer with a figure.

4. P26483L18. Why have you not resampled the CARIBIC data to the latitude distribution of the ACE-FTS data (i.e. 40-60N)?

5. P26483L25. What is the error on the growth rate, and what is the ESRL mean annual growth rate of the 2005-2008 time period?

6. Figure 2. Why does the colorbar for the months range from 0-12? Can you label the colorbar JFM, etc.?

7. Figure 5. List the latitude range for the CARIBIC measurements in the caption.

8. Figure 6. The two separate plots are confusing. Plot both data sets on the same axes. I am not convinced by your best fit lines in the top panel - they seem to miss many of the points, and you draw significant conclusions from them. Please justify the fitted curve or remove.

9. Figures 7-10. Please show the error bars.

Technical comments

1. P26481L2. I believe you are referring to Fig. 4b.

2. P26481L11. "Averaging over less occultations may increases" –> "Averaging over fewer occultations may increase"

3. P26481L15. Remove ", for the first time,"

4. P26484L25. on –> in

5. P26489L12. Remove ", for the first time,"

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 26473, 2010.