

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.

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Dear referee,

Thanks for your constructive and helpful comments. Following the answers to each technical and specific comments.

Specific comment

1 – page 26476 : Explanation added in the text : Rinsland et al. (2010), using ACE/FTS and a method similar to that of Foucher et al. (2009), have retrieved average dry air CO₂ mole fractions in the layer 7–10 km but did not extend their study to the retrieval

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of profiles. Beagley et al. (2010), again using ACE/FTS, have retrieved CO₂ profiles in the mesosphere and lower thermosphere where the problem of pointing knowledge uncertainties is not a concern.

2 – page26477 : Clarified. Tangent height is the proper expression. All “tangent altitude” have been removed.

3 – page26477 : You are right. We NOW use six micro-windows. The text has been clarified.

4 – page26481 : This sentence has been reworded: “Five years (2004-2008) of ACE-FTS observations have been processed using the method briefly described above. Thoroughly validated, they will provide CO₂ vertical profiles on a near global scale. Here, we focus...”

5 – page26483 : Caribic data cover the latitude band 20-55° as mentioned in the text. The information has been added in the figure and in the corresponding legend.

6- page26484 : To answer both this item and the next one, a sentence has been added page26483 line 7 : “ These comparisons are not direct because they do not exactly match, in particular spatially. However, they may bring important conclusions on the accuracy with which ACE/FTS may retrieve the CO₂ trend and seasonal variations with altitude.”

7- page26484 : Correction done “can also be compared to results from SPURT (see Fig.9 ...) in term of seasonal variations especially.”

8- page26489 : corrections done

Technical comments

All modifications and improvements suggested done

1- 26483 line 24 : text changed to “The retrieved annual growth rate is about

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1.9 ppm yr⁻¹ (+/- 0.2 ppm) from 2005 to 2008, in agreement with the mean annual growth rate observed at the surface for this time period (see, for example, <http://www.esrl.noaa.gov/gmd/ccgg/trends/>)

2- 26489 line18, "in situ aircraft measurements" deleted

3- 26493, line 17, doi number changed.

4- 26497 Fig.1 explanation added

5- 26498 Fig 2 top and bottom : done; fig 3 : unit added.

6- 26501 Fig 4b "averaging kernel" and "7" added

7- 26502 Fig 5 (top) : modified

8- 26503 Fig 6(top) : legend clarified to explain theta and Z relationship.

9- 26504 Fig7 to 12 : P replaced by pressure and CO2 VMR added. Legend has been clarified.

10- 26510 Fig A2 and A3 : Legend has been clarified.

Best regards,

Pierre-Yves Foucher

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