

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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Received and published: 8 February 2011

Dear referee,

Thanks for your helpfull and constructive comments.

General comments :

1- The title has been modified and now reads: "First carbon dioxide atmospheric vertical profiles from 5 to 25 km altitude retrieved from space observation using ACE-FTS solar occultation instrument."

2- Errors are mentioned in the text but not on all figures not to make them too confusing
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(see below, item 9).

3- Most of the figures have been clarified and modified

Specific comments:

1- 26475 line 24 : TES Kulawik et al. ACP (2010) reference added.

2- 26479 line 4 : the criterion of a lowest tangent altitude < 12 km is mainly to avoid cloudy occultations (we do not clearly see what the reviewer means by "sunset bias")

3- 26482 line 7 : such a figure could focus the reader on it when the text is more important, for example the fact that the standard deviations include the natural CO₂ variability. Error bars are shown in the figures of the Appendix.

4- 26483 line 18 : we thought it was not worth doing so due to the quite different space-time resolutions of the two systems. Results of such a comparison must be considered as a gross estimation of the accuracy reachable by ACE.

5- 26483 line 25 : ESRL : NOAA Earth System Research Lab.; mean growth rates from ESRL at Mauna Loa: 2005 2.53; 2006 1.72; 2007 2.18; 2008 1.66. Error on the growth rate added in the text.

6- Fig 2 : top: the numbers "3", "6", etc replaced by "March", "June", etc. bottom: legend clarified.

7- Fig 5 : CARIBIC latitude range added in figure 5.

8- Fig 6 : The fit results from a nonlinear iterative Levenberg- Marquard method. The reviewers comments may apply to the 16-18 km fit for which data are somewhat noiser. Mention of the algorithm used has been added in the text.

9- Fig 7-10 : these figures have initially been produced with error bars. They appeared quite confusing and difficult to look at. This is the reason why we have introduced the text p26482 lines 7-20. See also item 3 above.

Technical comments

1- P 264821 line 2 : yes; done

2- 26481 line 11 : done

3- done

4- done

5- Sentence changed to : "In this paper we have presented, for the first time in the altitude range 5-25 km, five years of monthly mean CO₂ vertical profiles from the ACE-FTS limb-viewing space-borne instrument (Bernath et al., 2005)."

Best regards,

Pierre-Yves Foucher

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

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