

***Interactive comment on* “Technical Note:
Feasibility of CO₂ profile retrieval from limb
viewing solar occultation made by the ACE-FTS
instrument” by P. Y. Foucher et al.**

P. Y. Foucher et al.

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I. General comments:

From the last version, the two main points (which are linked) were: (i) the choice of the journal and, (ii) the fact that no results from ACE-FTS real data were shown in the paper. The new version now includes tangent height N₂-retrievals and first CO₂ profiles from real ACE-FTS data. These retrievals from real data which seem coherent with our present knowledge of CO₂ atmospheric distribution confirm the results of the feasibility study and solve the discussion about the choice of the journal.

II. Answer to Referee #1

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General comments:

I have had some contacts and discussions with G. Toon during the three last years but I don't know any reference on the possibility to retrieve pointing information from N2 continuum.

Micro-window width optimization section has been reduced as well as modifications have been included in the vertical resolution part.

First results from real data have been included now (see general comments).

Specific comments:

Eq 2. : Rodgers has been added as reference for this equation.

P 418 I 25 : 'resolution' changed by 'spectral grid'.

P 420 I 12: A clear definition of geometric tangent height has been added in the text. The geometric tangent height is the tangent height of the optical path tangent to the true path outside the atmosphere and considered with no refraction.

P 421 I 15: I delete the sentence 'Finally, spectral regions for which Radiative transfer model is not relevant are rejected'. The meaning was unclear.

P 424 I 17: The suggestion "this constraint has a strong effect" is more appropriate. At the end of this part, I have added a sentence to explain that Tikhonov regularization is used for N2-retrieval and a priori covariance matrix is used to retrieve CO2 profiles.

P 428 I 1: The sentence about vertical resolution limited by field of view has been deleted.

P 428 I 6: 'exceed' changed by 'vertical resolution can be better'

P 429 top: Technical information has been moved to the corresponding figure.

P 429 I 15: 'high' changed by 'worse'.

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P429 I 20: A sentence in term of 'measurement grid' and 'retrieval grid' has been added.

P429 end: 'matrix' changed by 'vector'.

P430 I 11: 'error' and 'dispersion' changed respectively by 'accuracy' and 'precision' from here to the end.

P 430 I 19: I Results from real observations have been added. See above: general comments.

P 431 I 20/21: This statement refers to the fact that for N2-retrieval from real data, there was an unexplained difference between retrieved altitude using N2 region around 2450 cm-1 and using N2 region around 2500 cm-1. This problem has been solved in the meantime and this sentence has been deleted in the new version.

P 433 I 14: I have changed this sentence accordingly.

P 434 I 16: These advertisements are from the editor, I did not include them in the version submitted.

Technical comments: All the corrections have been made.

III. Answer to referee #2:

General comment:

Some first results from real data have been added (see general comments at the beginning of the answer to referee 1) Introduction and micro-window width optimization part have been reduced.

Specific points:

Abstract

L 7-10: As most of the synthetic study is based on real data and that CO2 profiles retrievals from real ACE-FTS measurements have been included, I do not change this

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sentence.

Introduction

I have cut a significant part of the introduction about Brewer-Dobson circulation in particular (from line 17 to 24 (p412) and from line 27 (p412) to line 4 (p413).

P 415 I 24: change made accordingly.

Chapter 2 I do not change the chapter title as results from real data are now shown in the new version.

P 418 I 8: Same comment as above.

Chapter 3 Figs. 1 to 3: I have added that these figures are from RTM calculation.

P420 I 12: I have defined "true" and "geometric" tangent height in the new version. See previous answer to referee #1.

Chapter 4

P 429 I 26: change made accordingly.

Chapter 5

P 431 to P 432: I have made all the corrections on standard deviation or maximum values you have mentioned.

Chapter 6

P 433, I 10: As the first results from real ACE-FTS data are now shown we can keep this conclusion.

Technical points

P422 I 1: "The impact of species is confirmed..." has been deleted. The sentence begins by "Figure 5 shows transmittance jacobians ..."

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