Atmos. Chem. Phys. Discuss., 7, S7601–S7603, 2007
www.atmos-chem-phys-discuss.net/7/S7601/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Accounting for the effect of horizontal gradients in limb measurements of scattered sunlight" *by* J. Puķīte et al.

Anonymous Referee #1

Received and published: 11 December 2007

GENERAL COMMENT: The paper is very well written and informative. It is very well suited to be published, with some additions (see below). The authors should be commanded for such a clear expose and nicely presented results. This paper should be very well received by the Limb Scatter community, as it gives insight on how to deal with inhomogeneity effects. Three main points: (1)This paper does assume that the reader has a good background in retrieval method and relies somewhat heavily on past references, mainly from the lead author. In view of the fact that the whole scheme depends on the AMF factors, I would ask for a better definition of these factors. Please define them better, in 1D, write down the equation. In the text, it is only defined as ratio of slant path column density to vertical column density. As such, it appears it is only geometrical (which it is in the optically thin limit), but in fact it does incorporate

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absorption along the slant path. If you thoroughly explain it in 1D, then you do not need any more explaination for the 2D case. I assume that the VCD within a cell is only the product of the density within that cell and the height of the cell. If that is all it is, please state it, or explain further. (2)Again on the airmass factor, since all your method relies on them. You need to tell the reader how they are computed. (even though you have described it in earlier paper). You cannot have no explanation at all, you need to give a few sentences on how you use your Monte Carlo code to evaluate them. And why do you need a Monte Carlo code? Could not you derive from a 2D RT code? Do the air mass factor need to be recomputed for each specific case. (3)To appreciate the computation required to go from 1D to 2D, please, state the CPU time required to do a sample computation.

SPECIFIC COMMENTS (1) 1) Does the paper address relevant scientific questions within the scope of ACP? YES 2) Does the paper present novel concepts, ideas, tools, or data? YES 3) Are substantial conclusions reached? YES 4) Are the scientific methods and assumptions valid and clearly outlined? YES 5) Are the results sufficient to support the interpretations and conclusions? NOT QUITE. See above 6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? NEED MORE EXPLANATION 7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution? YES 8) Does the title clearly reflect the contents of the paper? YES 9) Does the abstract provide a concise and complete summary? YES. 10) Is the overall presentation well structured and clear? YES 11) Is the language fluent and precise? YES 12) Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? NO, and that is a problem. SCD and VCD have to be defined with equations 13) Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? YES. See above 14) Are the number and quality of references appropriate? YES 15) Is the amount and quality of supplementary material appropriate? N/A

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7, S7601–S7603, 2007

SPECIFIC COMMENTS (2) (a) The authors are using the word “elevation” instead of “Tangent height”, which may be confusing when ones knows that in the Limb Scatter community, the word “elevation” is used to refer to up/down scanning. Minor, but irritating.. (b) I guess that you have multiple scattering. Why is it that (1) Fig. 4 shows no effect on the TH below the TP, and (2) you can state (Page 6 top): the measurements are practically insensitive to atmosphere below? Surely, you can have photons bouncing back from layers below TP. (c)Page 3: You refer to “the swap across flying direction”. You may mean to write: “the cross track swath” (d)Page 3, bottom: ….”for every limb scanning sequence separately”, you may want :” for every limb scanning sequence one profile at a time” (e)There is sentence on Page 4 which mystifies me: “For that purpose, an overlap between …. is utilized”. What is meant there? Please provide more explanation if this is an important point. (f)Page 5: change “acquisition” for “retrieval”. COMMENTS ON THE FIGURES None. They all look great. You make the life of the reviewer easy

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 16155, 2007.