

Interactive comment on “Optical extinction by upper tropospheric/stratospheric aerosols and clouds: GOMOS observations for the period 2002–2008” by F. Vanhellemont et al.

Anonymous Referee #1

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General Comments:

The paper by presents the analysis of nearly 7 year of GOMOS optical extinction data. A long record of extinction data with good global coverage and moderate vertical resolution is now available. The paper is well written and structured. The special section on GOMOS results in ACP seems exactly the right place for publication.

The weakness of the paper is that the authors didn't highlighted what is actually new in this publication compared to the Vanhellemont et al. (2005) article. Is it just the same analysis now for seven years instead of only one year, or is this paper not the presentation of a real climatology compared to Vanhellemont et al. (2005). The authors should

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emphasise in more detail on the strengths and objectives one can achieve with this new climatology-like dataset, for example advantages compared to other instruments, probably the better sensitivity, the compilation of a continuing dataset in respect to SAGE and POAM instruments, and especially the excellent detection of weak volcano signals. I recommend to do this to some extend already in the abstract.

Detailed comments are listed below, although I see no major problems and the paper should be acceptable if the suggestions will be considered.

Specific comments:

Abstract:

The text is not highlighting what kind of results are really new, for example the authors might give some examples for the opportunity of new analyses.

“can be expected” sounds a bit vague for an abstract, where you have already confirmed the good quality of the data in the paper.

Please skip the last sentence and summarise a few results.

Introduction:

The introduction summarises very nicely the current status on stratospheric aerosols, but I would suggest a few more references, for example in section 2 the SPARC report on Stratospheric Aerosol and at the end of section 3 a review paper on PSC formation.

Retrieval Method:

I am missing the details on some instrument parameter like the field of view and vertical sampling. There isn't a quantitative discussion on retrieval errors. A number of problems and restrictions are mentioned but the resulting error in extinction is not presented. The smoothing effect is obvious, but the presentation of averaging kernels would allow to quantify the vertical resolution. Please add some more quantitative error discussion.

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Comparisons:

Why do the authors exclude PSC from the analyses but cirrus are taken into account. I guess PSC are easier to exclude. However, the following arguments in the manuscript (P11118L11-15) are also applicable for (subvisible) cirrus clouds around the polar tropopause. Please clarify.

Results:

There should be a comment why and how you handle negative – physically meaningless – extinctions in the retrieval and the analysis (Fig. 6).

To my mind it is more precise to say that GOMOS 'detects' PSC quite well, because so far the type classification is not possible.

The PSC temperature analysis is only a very rough approach, the results are looking very noisy and are not convincing me. There are missing informations: Is the temperature a retrieved quantity or based on meteorological analyses? The PSC formation temperature depends on H₂O and HNO₃ as well. Is this taken into account? The radius dependence is also not very obvious in the presented data, maybe there is a better way of visualise the information content of Figure 9b (e.g. 2D probability density). Please specify and highlight the limits of this qualitative analysis of section 5.3. Consequently (so far) the analysis allows to draw only 'moderate' conclusions (see below).

Conclusions:

The presented PSC analysis was definitively not sufficient to 'clearly confirm' the theoretical PSC temperature dependence. Please change the wording in the sense of the qualitative and not very detailed analysis.

Technical corrections:

P11114, L23: please explain the acronyms for extinction and wave length.

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P11118, L15: Is the coincidence window +/- 12 hours? This would be a quite a large value. The number of coincidences would help to visualise the statistical significance of the analysis.

P11125, L9: typo - 'and GOMOS is'

Fig. 6: It might help to visualise the jumps in the mean extinction by adding a 50

References:

Vanhellemont, et al.: A 2003 stratospheric aerosol extinction and PSC climatology from GOMOS measurements on Envisat, *Atmos. Chem. Phys.*, 5, 2413–2417, 2005.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 10, 11109, 2010.

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