

Review of the paper “AerGOM, an improved algorithm for stratospheric aerosol extinction retrieval from GOMOS observations. Part 1: Algorithm development.” by Vanhellmont et al.

This paper describes the AerGOM algorithm which is used in GOMOS aerosol extinction profile retrievals. The paper briefly describes the previous IPFv6.01 operational algorithm, describes the new features exercised in the AerGOM algorithm, and presents several Figures illustrating the new algorithm. A companion paper (Robert et al. 2015) discusses data validation in more detail.

Users of satellite data products benefit from algorithm discussions in AMT papers. The subject matter is worthy of publication as an AMT paper.

The paper should be published after revision based upon the reviewers suggestions.

Major comments

This reviewer feels it is fair to separate the algorithm discussion and data validation in two separate papers. A combined paper would likely be too long.

It is requested that a 3rd column be placed in Figure 5 which gives the base-10 logs of the positive portions of the extinction profiles. This will give the reader a better visual impression of the data. Also, it is appropriate to discuss in the text why the extinction values diverge so readily at altitudes below 20 km in Figure 5.

It is also requested that the correlation coefficients of the GOMOS and SAGE II time series of the AerGOM panels be stated either in the panels or stated in the figure caption of Figure 7. The phrase “seems to be very good” (Page 16, line 4) needs to be reinforced by a quantitative value.

There seems to be some contradiction and confusion in the discussion of the H₂O component of GOMOS observations. On Page 3, line 16, the text says that the B2 spectrometer “allows the measurement of water vapour”, and on Page 12, line 1 “while the SPB1 and SPB2 data are reserved for the retrieval of O₂ and H₂O”. Yet on page 15, line 26 “Finally, SPB2 data were not used (since all wavelengths are affected by water vapor, a species that is currently not retrieved by AerGOM),..”. It may be helpful to replace “allows” by “allows (in principle, but not currently exercised by AerGOM)” on page 3 to avoid confusion. Are the other bands influenced by H₂O transmittance? If so, how is H₂O treated by AerGOM?

Minor comments

There are many places in the text in which the English can be improved. I offer some suggested revisions.

Page 1, line 8. “Then, the discussion of the AerGOM..”

Page 1, line 18. “most instruments use the Sun as a light source, ..”

Page 2, line 8. “remains a problem, though the associated residual scintillations have been adequately characterized in a statistical analysis (Sofieva et al., 2010). The random nature of these perturbations..”

Page 2, line 12. “problem was identified..”

Page 2, line 27. “Finally, the AerGOM aerosol/cloud ..”

Page 2, lines 28 – 30. Place these sentences “It should be mentioned ..” at the end of the paper. The last paragraph on page 2 should focus on telling the reader the structure of your paper.

Page 3, line 2. “instrument and measurement principles are described...”

Page 3, line 17 “characteristics are summarized ..”

Page 4, line 5. It may be helpful to inform the reader that the selection of stellar temperatures includes most stars i.e. “ranging from 3000-30,000 K (i.e. most stellar spectral types)”.

Page 4, line 12. “can be found in Kyrölä et al. (2010, 2012)”.

Page 4, line 26. I am not familiar with the “refractive dilution physics”. Please add a sentence or two to clarify.

Page 5, line 23. Spell out the DOAS abbreviation.

Page 6, line 2. “with the n_{O_3} and $\beta_{aer,500}$ vectors representing..”

Page 6, line 23. “and are used as the transmittance data source ..”

Page 6, line 26 “found in Bertaux et al. (2010)..”

Page 6, line 26 “extinction validation results are presented by ..”

Page 6, line 29 “fact that IPFv6.01 GOMOS ..”

Page 7, 1st line. “found further in Figures 5, 6, and 7 (discussed below)”.

Page 7, line 9 The phrase “all covariances are retained by the solution” may be better than “all covariances remain in the system”.

Page 7, line 11 “of the solution”.

Page 9, line 5. Define N_{air} .

Page 11, line 15. “spectra and fits are..”

Page 12, line 2. “this is regrettable”. Since the SPB2 data, however, is not used, the sentence is superfluous.

Page 12, line 6. State the date, latitude and longitude of the spectra in Figure 4.

Page 12, line 10. Replace “interest) plenty of information is present” by “interest) since a very useful range of transmittance is present”

Page 15, line 29. Does the data set refer to all spectra and retrieval values? Clarify by stating in ()’s e.g. (spectra, columns, retrieved profiles) what quantities are in the 74 Gb of disk space.

Page 15, line 9. Are the 115 extinction selected throughout all years of the data, and at a variety of latitudes? Please clarify.

Page 17, Figure 6. There is overlap in my copy of the paper between the 10^{-3} and 10^{-4} y axis labels and the panel titles. Eliminate this problem by redoing the graphs.