

Interactive comment on “Influence of scintillation on GOMOS ozone retrievals” by V. F. Sofieva et al.

Anonymous Referee #2

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General comments: The paper contains valuable information on the influence of scintillation on GOMOS retrievals. The introduction should define anisotropic and isotropic oscillations before the terms are used. One paragraph about the GOMOS instrument and the Envisat satellite is necessary in the introduction to supply details relevant to this paper (e.g. orbital altitude). It should be stated that the FOV of the photometer and the spectrometer are exactly the same. A reference to Kyrola et al. (Adv. Space. Res. 2004) would be useful since the optical layout is illustrated there. Consider hypothetically, if there were no wavelength dependence to the scintillation. Then, shouldn't a DOAS spectral fitting approach be unaffected? Someone who speaks English as a first language should have edited this paper.

Specific comments:

The use of "altitude" where "tangent altitude" is intended should be corrected (including

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in the Figures (e.g. Figure 10a).

p12617, L23 (& Fig 1B) Is the trend in intensity vs. time) removed before the rms is calculated? Over which time period is the rms statistic calculated?

p12620, Eq.3 Is there a reference for this equation? Some background is needed otherwise.

p12620, L15 A reference for "Hanning filter" is suggested.

p12620, L16 The use of a 3 km FWHM should be justified as also mentioned by the other reviewer. Why not use a boxcar with a FW of 0.5 s, equal to the spectrometer integration time?

p12622, L14 Re: "absorption effect included", is scattering ignored? If not, you could use the term "extinction"

p12622, L19 As also pointed out by the other reviewer, the quality of the residuals after scintillation correction is exaggerated. I suggest "2% for altitudes above ~20 km." and a removal of "in the main ozone layer".

p12622, L22 Re: Monte Carlo simulations, some details of the method are required (so that I could do something similar). Why are different results obtained for different runs? In other words, which inputs are random (i.e. varied)?

p12624, L3 Re: Fresnel scale, you find 0.45–0.6 m, but using the following inputs:

$\lambda_1=500$ nm $\lambda_2=600$ nm $z_{\text{sat}}=800$ km tangent height= 20 km Earth radius= 6378 km $L=3254$ km

I find the Fresnel scale is ~ 1.6 m.

p12626, L19: Is this equation empirically derived? If so, this should be stated, otherwise provide a reference.

p12627, Eq.14: 'p' should be replaced by 'ch' for the vertical chromatic shift, since p is

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used to represent impact parameter, and since 'ch' is used in Figure 4c.

p12628,L18 Why is there a 'noise' component for a simulated quantity?

p12630,L14 "sampling resolution" -> "vertical sampling"

p12630,L16 "...removing..." -> "...reducing..."

Figure 4: (caption) "phase screen" is either not defined correctly or not the appropriate term. Given its definition "plane perpendicular to the light rays...", there should be no difference for oblique and non-oblique occultations. Did you mean: #1) the plane orthogonal to the satellite velocity vector, or #2) the orbital plane?

I would suggest that the arrows be removed from panels A-B. In B, the diagonal lines should terminate on the black line (if you meant #2).

Figure 5: What is the residual at 515 nm, shown to the right but inconspicuous on the color plots (left)? Some 'massaging' of data appears to have been done, also since the feature at 630 nm appears in the lower color plot, but strangely not the upper one?

Technical comments:

There are too many instances of a missing article ("a", "the") to list them all. Examples will be provided below.

p12616,L18 "...in error of ozone retrievals..." -> "...in ozone retrieval errors..."

p12617,L5 "Almost exponential..." -> "The exponential..."

p12617,L6 "bending of rays" -> "the bending of rays"

p12617,L6 "... (the lower tangent altitude, the larger bending)." -> "... (the lower the tangent altitude, the larger the bending)."

p12617,L15 "...different kinds of ... instabilities." -> "...and other kinds of instabilities."

p12617,L27 "...which have significantly..." -> "...which have a significantly..."

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p12618,L14 (and elsewhere) "...discussed in (Polyakov et al., 2001). " "...discussed by Polyakov et al. (2001)."

p12618,L25 "In our estimates..." -> "In our correction..."

p12618,L26 "We restrict..." -> "We restrict the scope of this work to consider..."

p12618,L26-27 "...consider the ... on the ozone retrieval only..." -> "...consider only the ... on the retrieval of ozone..."

p12618,L29 "Quality..." -> "The quality..."

p12621,L6 "...spectrometer measurement..." -> "spectrometer pixel" or "spectrometer channel"

p12621,L24 "...eliminates almost perfectly..." -> "...almost perfectly eliminates..."

p12622,L3 "...photometer records not monochromatic scintillations but averaged..." -> "...photometer does not record monochromatic intensity, but rather averages over the wavelength band of the optical filter"

p12622,L9 "...model (details of..." -> "...model. Details of..."

p12623,L8 "synchronous"->"coincident"

p12628,L11 "...twice larger..." -> "...twice as large..."

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 12615, 2009.

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