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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Influence of scintillation on GOMOS ozone retrievals" *by* V. F. Sofieva et al.

**Anonymous Referee #1**

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Overview

I see no major problems with the paper. The corrections applied to the GOMOS spectra are necessary to maximize accuracy and are performed in a reasonable fashion. As part of a special issue describing GOMOS processing, it is a valuable addition.

General Comments

My largest concern is the Introduction. There are a number of grammar problems in this section (and a few in the Abstract as well). A few items are discussed in the Introduction without description or explanation, only to be described in more depth later. For example, stellar occultation is discussed, but reference to a figure depicting the geometry isn't provided until the beginning of section 2. GOMOS fast photometers are discussed and a figure is presented, but information on the photometers isn't really presented until section 2. I just felt information presented in the Introduction wasn't



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quite logically organized in relation to the rest of the paper.

There is no mission description in the Introduction, or at the very least a reference to a mission overview. I realize this paper is part of a special issue, but it should still be somewhat self-contained.

Mention is made a few times that the residual errors from uncorrected effects of isotropic scintillations are significant for bright stars, but that wording is vague. I assume that means the contribution to the error is similar regardless of star brightness, but other errors vary with star brightness and are a minimum for the brightest stars, meaning the error from this source is a smaller percentage of the total error for dimmer stars. However, I think there are different ways to interpret that statement.

The statement is made that using regularization reduces retrieval errors. I assume you are saying regularization reduces unphysical oscillations in the retrieved profiles that arise from uncorrected scintillation effects in the observed spectra, and stronger regularization in oblique occultations is a benefit because the unphysical oscillations are larger in these occultations. To imply that increased regularization equates to reduced errors in general would be somewhat misleading. It is true for this special case. In other situations, increasing regularization could increase errors through excessive smoothing of the retrieved profiles.

Specific Comments

Page 12620, line 15: you say you generate a smoothing for l(t) using a Hanning filter with a FWHM of about 3 km, but the variable being averaged over appears to be time, not distance. I thought perhaps you meant the time it took for the tangent height to change by 3 km, but with refraction effects at low altitudes, that time is not constant, so it wasn't clear what this meant.

Page 12622, line 20: You say the residual scintillation modulation is below 1% above $\sim$20 km. From Figure 2, it would be more accurate to say it is less than 1% above 23



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km (for the example shown). Considering the location of the ozone concentration peak, some people might consider this a significant distinction.

Page 12626, line 19: what is the variable xi_o? It is never defined. Should it just be xi?

Page 12627, line 5: what is rho_o, the average density at altitude z from the reference set?

Technical corrections

Page 12619, line 21: your comma (after T_ref) comes out as a subscript of a subscript.

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