Dear Reviewer,
Thank you very much for your attention to our paper "Retrievals from GOMOS stellar occultation measurements using characterization of modeling errors" and for the useful comments. Please find below our replies to your comments.

*Reviewer #2:*
*The authors address the impact on error in the final vertical profiles but they never relate how the vertical profiles themselves are changed as a result of including the new error term. More Serious Issue 1) I feel that the paper needs two or three paragraphs and a figure that address the impact on the final results not just their errors. This is not expected to be a major issue.*

Authors:
We added a discussion about the influence of including modeling errors on the final results, the local density profiles of atmospheric constituents, and a figure (Figure 4 in the revised version) illustrating these effects.

*Reviewer #2*
*I needed to read the paper a few times to fully appreciate the two stage retrieval process and exactly where the modification fit in. This needs to be made more clear with a sentence or two within the text.*

Authors:
We clarified these issues in the revised version, in introduction.

*Reviewer #2:*
*I assume that in the retrieval of column densities the density for each tangent altitude is retrieved independent of the other tangent altitudes. If this is the case it was not clear. If this isn't the case then it really wasn't clear. A sentence or two should fix this. You also might want to reformulate how you define the vectors T as they are defined to be functions of two variables, wavelength and tangent altitude, but in practice within the retrieval they are only one dimensional, that being wavelength.*

Authors:
Yes, the retrievals of horizontal column densities are performed for each tangent altitude separately. This was mentioned in the original manuscript, and this is stressed in the revised version. We have added also an equation (Eq.(1) in the revised version) that formulates the spectral inversion problem, thus explaining the relation between the measurements (transmission spectra) and retrieved parameters (horizontal column densities).

*Reviewer #2:*
*The authors have left out many variable definitions within equations. For example what is N in equation 1). I assume it is iteration number.*

Authors:

The variables are explained in the revised version.

*Reviewer #2:*
*The authors need to better define their four sets of measurements that they use as a test. How many, where etc. were never mentioned.*

Authors:
The detailed information about the data sets is collected in Table 1 (as written in p. 588 lines 3-4 of the original manuscript).

*Reviewer #2:*
*What species do the results in Figure2 refer to?*

Authors:
Figure 2 shows the normalized $\chi^2$ statistics, $\chi^2_{norm}$. It is defined by Eq.(1) and in p.587, lines 13-15 of the original manuscript. In this page, the meaning of this parameter is also explained.

*Reviewer #2:*
*If I look at the "red" dots in the plots of Figure 2 I see a bunch of them that are greater than the solid line mean value and none that are less than the solid line mean value. How is this possible?*

Authors:
As stated in caption of Figure 2, solid lines represent median values: therefore, the ranges of values to the left and to the right from the median can be not equal (in case of non-symmetric distribution). If you look at this figure with a zoom, it will be evident that there are also points smaller than the median (the numbers of points smaller and larger than the median are equal, according to the definition of the median value).

*Reviewer #2:*
*I feel that Figure 3 is not adequately discussed within the text. Why were the operational results included and more importantly why do I care if the results are smoother. This issue ties in with the more serious issue I raised about the quality of the final retrieved product not just the quality of the error bar.*

Authors:
This issue is related even with a more general issue of influence of scintillations on retrievals from stellar occultation measurements. Due to their random nature, scintillations do not produce any bias in the statistics of an ensemble of reconstructed profiles, but they result in fluctuations in retrieved profiles of atmospheric constituents. These notes are added to the introduction.
If the spectral inversion is performed “as is” (Eqs.(1) and (2) of the revised version), the $NO_2$ and $NO_3$ profiles often have large unrealistic fluctuations, even for very bright stars (as can be seen in Figure 1, blue lines, for example). To resolve this problem, the Global DOAS Iterative method is applied after the spectral inversion for $NO_2$ and $NO_3$ in the

operational processing. From our point of view, the increased smoothness of the profiles with the FCM method is an interesting feature, because it originates only from the correct measurement error characterization (this is neither regularization nor the modeling perturbations due to scintillation nor changes in the inversion method). These issues are discussed in our paper.