Dear Reviewer,

Thank you very much for your positive comments on our paper "Variable anisotropy of small-scale stratospheric irregularities retrieved from stellar scintillation measurements by GOMOS/Envisat". Below we present the replies to your comments.

Reviewer #1.
Minor comments
1. p.1277, l.17ff: The reference Ern et al., JGR, 2011 should be included here, because this more comprehensive study covers also different seasons and a larger altitude range.
Citation:
Ern, M., P. Preusse, J. C. Gille, C. L. Hepplewhite, M. G. Mlynczak, J. M. Russell III, and M. Riese (2011), Implications for atmospheric dynamics derived from global observations of gravity wave momentum flux in stratosphere and mesosphere, J. Geophys. Res., 116, D19107, doi:10.1029/2011JD015821.

Authors: The reference is added, thank you.

Reviewer #1:
2. p.1278, l.21: The chromatic vertical shift Δ_c is at which point along the line of sight?

Authors: In the revised version, we have added that the chromatic shift Δ_c corresponds to the ray perigee and the reference on the paper (Dalaudier et al, 2001)

Reviewer #1:
3. p.1280, ll.14ff: Please state more clearly that the 1D spectrum is obtained by integrating Eq. 2 over the other wavenumber!

Authors:
In the revised version, we state this explicitly:
"The properties of 3-D and 1-D vertical and horizontal spectra, which are obtained by integration of Eq. (2) over wavenumber plane, are discussed in detail in Gurvich and Chunchuzov (2008a, b)".

Reviewer #1:
4. p.1281, ll.15-17: Please state more clearly that the "free-space" intensity fluctuations arise from mutual constructive and destructive superposition of the light waves.

Authors:
In the revised version, we have clarified: "…while intensity fluctuations appear as a results of light interference during free-space propagation from the atmosphere to a detector (Gurvich et al., 2006; Hubbard et al., 1978) "

Reviewer #1:
5. p.1282, ll.11ff: Here, you should elaborate somewhat on the approximation of weak scintillations. Does this approximation hold in the whole stratosphere, independent of the background state? Or could this approximation also be violated, for example during enhanced wave dissipation in strong vertical gradients of the zonal wind, such as jet reversals?

Authors:
The weak scintillation approximation is valid when $\sigma_I^2 << 1$. The rms of relative intensity fluctuations σ_I in the weak scintillation regime depends on the distance from the phase screen to the satellite, on intensity of atmospheric irregularities, and approximately proportional to the mean air density (for details, see Eq.(6) and below in (Sofieva et al., 2007)) . This strong nearly exponential dependence of σ_I with altitude provides the weak scintillation regime in the upper stratosphere. Even very strong scintillation "bursts" in the photometer signals associated with GW breaking (like shown in Figure 2 of (Sofieva et al.,

2007), black line) are in the weak scintillation regime. For GOMOS, transition to the saturation $\sigma_I^2 \approx 1$ occurs at altitudes 25-30 km (spatio-temporal patterns are shown in Figure 4 of (Sofieva et al., 2007)). In cases of strong wave breaking, e.g., at high latitudes in winter, large value of scintillation variance $\sigma_I^2 > 0.5$ can be observed also at slightly higher altitudes, ~35 km.

In the revised version, we added the note that the global distributions of scintillation variance are shown in (Sofieva et al., 2007)

Reference:

Sofieva et al. (2007): Global analysis of scintillation variance: Indication of gravity wave breaking in the polar winter upper stratosphere, Geophys. Res. Lett., 34(3), L03812, doi:10.1029/2006GL028132, 2007.

Reviewer #1:

6. p.1284,l.20: Why is the spectrum of isotropic scintillations displaced to higher frequencies with increasing obliquity angle? «Isotropic» should imply that the scales sampled should be the same for all scanning directions.

Authors:

We meant here temporal (Hz), not spatial (2π/m) frequencies. Therefore, increasing obliquity (which is accompanied by increasing full velocity of the ray in the phase screen with simultaneous decreasing its vertical component) results in frequency (Hz) separation of anisotropic and isotropic components of scintillation.

In the revised version, we clarified that this statement is for temporal auto-spectra.

Reviewer #1:

7. p.1294, l.12: The reference Ern and Preusse, GRL, 2012 should be added here, because simultaneous information on the horizontal and vertical scales of the dominant gravity waves is available from the spectra shown there.

Citation:

Ern, M., and P. Preusse (2012), Gravity wave momentum flux spectra observed from satellite in the summertime subtropics: Implications for global modeling, Geophys. Res. Lett., 39, L15810, doi:10.1029/2012GL052659.

Authors: Thank you, the reference is added.