

## ***Interactive comment on “Variable anisotropy of small-scale stratospheric irregularities retrieved from stellar scintillation measurements by GOMOS/Envisat” by V. Kan et al.***

**Anonymous Referee #1**

Received and published: 28 March 2014

### **General Comment**

In this very interesting paper stellar scintillation measurements by the GOMOS instrument are investigated. These scintillations were measured during “tangential occultations” of stars, requiring dedicated mission planning of GOMOS/ENVISAT operations. A method is presented to derive anisotropy coefficients from the scintillation spectra, assuming “weak scintillations”. The method is described in detail, and further discussion of results is provided. Estimates of the anisotropy coefficient are in good agreement with previous observations. Taking into account that there are only very

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few observations of the anisotropy coefficient in the stratosphere, it is noteworthy that the range of observed vertical scales / anisotropy coefficients is significantly extended compared to previous observations.

The manuscript is well written, and the results of the study are of general interest to the readership of AMT.

The publication of the manuscript in AMT is therefore recommended after addressing the few minor and technical comments given below.

### **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.

2. p.1278, l.21: The chromatic vertical shift  $\Delta_c$  is at which point along the line of sight?
3. p.1280, ll.14ff: Please state more clearly that the 1D spectrum is obtained by integrating Eq. 2 over the other wavenumber!

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

### Technical Comments

1. p.1276, ll.18/19: ...stellar scintillations in occultation experiments are...
2. p.1277, l.23: scintillations → scintillation
3. p.1278, ll.3/4: omit parentheses around references  
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4. p.1280, l.19: depends → depend
5. p.1284, l.10: crossed by → crossed simultaneously by
6. p.1286, l.18: with the detection of the
7. p.1286, l.26: of → of the
8. p.1287, l.22: spectra model → spectral model
9. p.1289, l.16: damping → damping of
10. p.1294, l.4: according our → according to our

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 1275, 2014.