

Interactive comment on “Limited angle tomography of mesoscale gravity waves by the infrared limb-sounder GLORIA” by Isabell Krisch et al.

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Received and published: 15 June 2018

Dear Dr. Christensen,

Thank you very much for these very helpful comments! We extended the explanation of the retrieval and the measurement diagnostics and improved the description of Figure 9 to make it easier for the reader to follow.

Please find detailed answers on all your comments below.

Sincerely, Isabell Krisch

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P7I23: How is the accuracy and precision calculated? In particular what errors go into this error analysis? Are things like pointing error of the instrument, thermal noise, calibration error, instrument characterization errors, spectroscopic errors or errors in the assumptions of the background atmosphere included? As short list is required for a reader to be able to judge whether all significant terms are included.

A description of all errors implemented in the diagnostics is included in the manuscript. These errors include pointing errors, misrepresented background gases, uncertainties in spectral line characterization, calibration errors and measurement noise.

P8I12: please clarify what “25 and 60 neighboring points” means in terms of approximate distance or pressure.

Corresponds to 750km in the horizontal and 3km in the vertical. Has been included in the text.

P14I10: It is a bit unclear to me that “horizontal orientation in this area... is not recovered”. For figure 9a, 9e, 9i, it does indeed look like the wave fronts are oriented from north-west to south-east. However, a degradation may be seen, but I have a bit hard time connecting the text with the figure. Perhaps explicitly writing out the directional error in the text (20 degrees?) would make it easier for the reader to follow.

The following text is added to better guide the reader through the Figure: Within the tangent point region (longitude between 1.5° and 2.5°) the horizontal wave fronts are oriented almost west to east. Behind the tangent point region (longitude above 2.5°), the wave fronts slowly approach the expected west-north-west to east-south-east orientation. The orientation error of this retrieval ranges between 30° and 10° depending on the area of interest.

P18 figure 11: In panel f) there is a large response in the retrieved values far

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below the tangent points. This is rather counter-intuitive, and the reason for it (I assume its caused by the horizontal regularization) should be written out in the text.

This information has been included in the text, however at an earlier position (Section 3.1): Astonishingly, the retrieval can also reproduce some signal outside the area covered by tangent points. One reason for that is, the path of the LOS which goes through higher altitudes before and after the tangent point, thus collecting information there. Another reason are the horizontal and vertical correlation lengths of 10 km and 0.1 km, which are used for the retrieval and smear out the signal.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-72, 2018.