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Atmospheric Measurement Techniques Discussions

# *Interactive comment on* "New perspectives on gravity wave remote sensing by spaceborne infrared limb imaging" *by* P. Preusse et al.

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The aim of the current paper is to give an overview of the prospects of infrared limb imaging for gravity wave research. The paper is addressed to scientists in the fields of gravity wave research and global atmospheric modeling interested in the scientific prospects of a new technique as well as technicians and retrieval specialists interested in the application of such new instruments. It therefore bridges a wide range of topics and cannot go into detail. For in-depth discussions we therefore have to refer to previous work.

The use of the word resolution for a single limb-ray is indeed misleading and we have rewritten the paragraph. Using the method developed by von Clarmann et al. (2009) can be an elegant way to estimate the sensitivity diagram without full end-to-end tests



of hundreds of cases. However, the method must involve the full 2D averaging kernel. The application of a purely horizontal filter to mimic the horizontal resolution results in a severe underestimation of the sensitivity at short horizontal wavelengths: Applying a Gaussian filter of 200 km (350 km) full-width half-maximum results in a sensitivity of 0.3 for 340 km (600 km) horizontal wavelength, independent of the vertical wavelength. At shorter horizontal wavelengths the sensitivity drops rapidly. The end-to-end retrieval simulations for CRISTA retrievals indicate sensitivities larger than 0.3 for horizontal wavelengths as short as 200 km for 10 km vertical wavelength. The reason for good sensitivity at short horizontal wavelengths is the phase coalignment. This is taken into account when using the full 2D averaging kernel as suggested by von Clarmann et al. (2009).

Estimates of the sensitivity of IR limb sounding for GWs of different horizontal and vertical wavelengths based on the full 2D averaging kernel are subject of ongoing work. In this paper all quantitative results are therefore based on end-to-end tests using full radiative transfer and retrieval simulations.

The vertical resolution is limited in a very complicating way by the measurement geometry, the instrument paramaters and the details of the retrieval (cf reply to reviewer 1). This cannot be discussed comprehensively in this paper. We have given what we think are the most relevant limiting factors. The most important information for the reader is the vertical resolution which can realistically be achieved.

A brief description of the 2D retrievals will be included and references to previous work will be given.

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