

## ***Interactive comment on “Superposition of gravity waves with different propagation characteristics observed by airborne and space-borne infrared sounders” by Isabell Krisch et al.***

### **Anonymous Referee #2**

Received and published: 1 July 2020

The manuscript describes the investigation of gravity waves in measurements from an airborne campaign over Scandinavia. This constitutes an interesting case study, with original measurement techniques providing an exceptional three-dimensional description of mesoscale gravity waves in the lowermost stratosphere. The study serves two purposes: 1. it illustrates a complex wave situation, which includes wavepackets on several scales (a main wave packet with wavelength 400 km, but also a complex background of shorter waves). 2. It demonstrates the capability of the GLORIA instrument to document a complex, multi-scale set of gravity waves. The manuscript is well written, the figures are well prepared, the references are relevant. Publication is recommended once the minor points below are addressed.

C1

#### Minor Points

l38 the technique can only retrieve wave characteristics in the UTLS? Is there something specific that imposes that the technique can only work in that altitude range?

l46: should the method of Schoon and Zuelicke (2018) also be mentioned here? Or is it intended mainly for model output and could not contribute with observations? For completeness, it could be mentioned in any case.

Caption of Fig 1: I do not fully understand what is meant by 'cover the dark grey area with the LOS.'? (By the way, LOS is introduced without explanation in this first sentence, it is spelled out with the acronym in parentheses a few lines later)

Caption of Fig 1.1: the sentence explaining the parabolic shape of the different lines of sight ("The line-of-sight (LOS), which is a straight line in reality, has a parabolic shape in this plot due to the transformation into a Cartesian coordinate system with the x-axis following the Earth surface.") should come earlier in the caption. It is the basis of the figure. Once that is explained, the meaning of the colored dots, of dark and grey shade areas can be explained, they become much clearer.

l237: 'the complete west coast' -> 'the west coast'?

l245: in km/h ( $\text{km}\cdot\text{h}^{-1}$ ) there should be a space between km and h.

Figure 5: a color different than the light yellow should be chosen for the second ECMWF curve. It is too hard to see.

l350: do the authors judge that such an extension of the S2D

l426 'limited angle tomography': add a parentheses recalling the acronym (LAT) as it was used earlier in the paper. This may help the reader who is starting with the conclusion and then working back through the rest of the paper.

How confident are the authors in the checkerboard pattern that remains after removal of the large-scale wave signal?

C2

l440: the conclusion ("Therefore") that the large-scale wave packet results of several sources is not the appropriate statement supported by the investigation: rather, the investigation and ray-tracing carried out does not allow to decide on the source of the waves. It is possible, or even plausible, that several sources contributed to the observed waves.

l449: again, perhaps recall the acronym (LAT); note that a hyphen is used here (limited-angle tomography), but in other instances it is not. The authors should homogenize.

===== Schoon  
and Zuelicke, 2018): A novel method for the extraction of local gravity wave parameters from gridded three-dimensional data: description, validation, and application, ATMOSPHERIC CHEMISTRY AND PHYSICS, 18, 9, 6971-6983 DOI: 10.5194/acp-18-6971-2018

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-327>, 2020.