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Atmospheric Measurement Techniques Discussions

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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This study provides a rigorous comparison between results from the GLORIA instrument, while operating in both full- and limited-angle tomography modes. It is well written and nicely organized. I believe the authors have done some excellent work and the study has significant potential. However, there are some critical details which should be addressed in more detail prior to publication. Specifically, I would like the authors to address the following.

Major Issues:

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-P2_L23: You have described the FAT imaging volume as a cylinder, which is to be expected given the circular flight pattern described previously. You then go on to describe the LAT imaging region as simply a '3-D volume.' I suggest this imaging region, its shape, and dimensions require more of an explanation. In the conclusion (P17_L11), you refer to the FAT volume is 'cubic.' Is this a contradiction?

-The LAT flightpath geometry should be described in more detail. Specifically, the vertical curvature of the flight path is never discussed. Did this cause inconsistencies in image resolution as the altitude between GWs and GLORIA varied? Were edge effects or 'smearing' a problem as the altitude increased?

- You describe a 200-km horizontal extent perpendicular to the flight path (P2_L25). The resolution of overhead multi-angle images typically degrades moving towards the edge of the images (away from the nadir). Was this effect compensated for in any of your preprocessing steps?

-The initialization of tomography algorithms can have a profound effect on the resulting reconstructions and I believe your initialization (P6_L27) needs to be described in far more detail. This climatological field ac should be discussed further. How was it developed? How do you know it is accurate?

-It doesn't appear you have done any synthetic testing of your tomography algorithm. In this process, artificial projection (brightness) data are produced from a known synthetic structure and are then used to produce a 3D reconstruction. This result is compared with the original synthetic object to determine the accuracy of the algorithm. This approach can also be used to identify issues such as edge effects or biasing which results from the initialization model. Could you comment on this or perhaps include some sample synthetic results?

-P7_L21: You state the horizontal resolution along the flightpath is 30 km. Is this the image resolution? This isn't consistent with a field of view spanning only 100-200 km. -You might consider quantifying the spatial agreement between the resulting images in

Figure 11 (i.e., (b) and (e), (c) and (f)). Common metrics include the structural similarity index measurement (SSIM) or the Pearson correlation coefficient (PCC).

Minor Issues:

-P4_L24: 'with a 2-D detector array Friedl-Vallon et al. (2014).' This citation should be placed in brackets.

-P7_L21: Why did you decide to use values 'larger than half the maximum'?

-I am a little confused by your statement in the caption of Figure 2. You state the line-of-sight measurements assume a parabolic shape due to the cartesian coordinate system. Are you implying they are straight on a curved surface and then warped when plotted using straight axes?

-P10_L4: In discussing tomographic retrieval of gravity waves from atmospheric data, you have only cited one study. However, there have been multiple studies on this topic, using data from satellites such as ODIN and AIM. I suggest expanding these references.

-You need to be clearer about the differences between the rows in Figure 3. (a) and (c) show true waves which are nearly identical. Why are the retrieved waves so different?

-P19_L9: What kind of artifacts are you referring to? Can you describe them?

-It is unclear what 'lz' and 'lh' refer to in Figure 9.

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