

Interactive comment on “Retrieval of three-dimensional small scale structures in upper tropospheric/lower stratospheric composition as measured by GLORIA” by M. Kaufmann et al.

Anonymous Referee #1

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This paper by Kaufmann et al. details the observational modes and results from the first two GLORIA aircraft flights. The first flight, ESSENCE, was designed to test the instrument along with its ability to retrieve simple one-dimension profiles while the second flight, TACTS/ESMVal, provided insight into the ability of GLORIA to make appropriate measurements for a three dimensional tomographic retrieval of atmospheric constituents. This paper is very well written and provides a nice extension to the existing literature describing the GLORIA instrument, both its design and calibration, and the simulated retrievals associated with the GLORIA measurements. The author's and their entire team should be proud of what they have accomplished and the paper should

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proceed with very little revision.

Minor points

I also downloaded the Kleinert et al. (2014) paper and after browsing it I was still a little uncertain as to the discussion near the end of page 4239 and the beginning of page 4240. It seems like some averaging is done. Is this done before or after the Fourier Transform is taken? Is a final image a two dimensional data set with one dimension being the vertical spatial dimension and the other dimension the spectral dimension? This could be made a little more clear. Is a spectral window a single wavenumber or are the plots in Figure 6 the average radiance over a spectral range?

The last line of page 4245 should have the word 'to' instead of 'so'. Is the wind speed significant for the tomographic results in the second campaign? I would like to see a paragraph that tells me the measurements are made significantly close together in time such that the wind speeds of up to 45 m per second don't affect the requirement that each retrieved value remains constant over the entire duration that it is measured. Why isn't temperature plotted in Figure 16? I would suggest the authors take the discussion around Figure 18 out of the conclusions and move it to just before the conclusions.

Concluding Remarks

This paper is well written and should be published. Nicely done on not only this paper but on all of the GLORIA work.

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