

## ***Interactive comment on “Gimballed Limb Observer for Radiance Imaging of the Atmosphere (GLORIA) scientific objectives” by M. Riese et al.***

**Anonymous Referee #1**

Received and published: 15 April 2014

This is an overview paper on the scientific objectives of the GLORIA instrument, which has been tested in some recent aircraft campaigns and will be deployed in several future aircraft campaigns. The prospect coming from the unprecedented spatial resolutions, in particular for UTLS studies is truly remarkable. I find the paper to be very clear and succinctly written, and easy to follow. However, similar to the already published reviewer #3 comments I am having a hard time identifying the specific role of this paper. It primarily comes across as an advertisement for the GLORIA instrument with a few brief review-style "blurbs" on the science objectives. There is essentially no new science here, at the same time elaborations are too short and at many places too specific to qualify for a review paper. It is also not really clear to me what is being reviewed? The instrument, which as far as I understand has so far only been used for

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demo purposes, so a review seems much too premature? Or UTLS science, for which there exist other more thorough reviews, e.g. the cited Gettelman et al., 2011?

In terms of the scientific objectives, I found myself wanting to see more detailed descriptions on how to improve our current understanding of UTLS processes. How do the authors think will the new data be used to answer the raised questions? Some specific ideas in such a direction would greatly enhance the value of this contribution.

More specific comments, incl. of editorial nature:

1537, lines 1-2: Lorenz' famous paper doesn't really talk about chaotic advection; a quick look at wikipedia tells me that "chaotic advection" is primarily due to Aref 1984: Stirring by chaotic advection (J. Fluid Mechanics)

1537, line 11: the -> a (there isn't just one global view)

1542, line 20: "resolution up to" - what is the typical range of resolutions, what is the resolution on average?

1543, line 16: this young air will still sink somewhat as long as it is still located above the tropopause

1543, line 22: "transport maximizes" - I assume this refers to the strength of the transport, as in minimization of transport time scale? please clarify (same formulation a little lower down)

1543, line 24: winter \_polar\_ stratosphere?

1544, line 7: objectives

1544, line 14: "are in the centre of" -> are central to

1545, line 19: influenced by

1547, line 16: tropical upper troposphere

1547, line 26: "heads of tape recorders" - needs to be explained

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1548, line 13: "colder Arctic temperatures" - I assume this refers to CO2-related climate change - should be explained

1548, line 25: "extra vortex air" (also other instances of this term): I assume this refers to air located outside of the vortex? May not be clear to readers and should be clarified at first instance.

1549, line 10: not sure I understand this sentence, could you reformulate?

1550, line 2: I assume vertical velocity (required for estimation of vertical momentum flux) won't be measured directly, so "derived" appears to implicitly include some approximations, correct? As such, this sentence may be a slight overstatement.

Fig. 1: I find it confusing that there is only one white wave-like arrow, which could mislead some readers into thinking there is only one place for quasi-horizontal mixing/transport. Suggest to include a few more along the tropopause. Also, 2nd sentence: blue \_region\_

Fig. 8: it'd be helpful to link this to Fig. 7; the 2.7 ppbv "contour" is really an "isosurface"

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 1535, 2014.