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Interactive comment on “Validation of first chemistry mode retrieval results from new limb-imaging FTS GLORIA with correlative MIPAS-STR observations” by W. Woiwode et al.

Anonymous Referee #1

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The paper reports the results of the comparison between retrieval products obtained by the limb-imaging FTIR spectrometer GLORIA and the MIPAS-STR limb scanning infrared FTS simultaneously flown on board the stratospheric research aircraft M-55 Geophysica during the ESSenCe flight in the Arctic polar vortex on 16 December 2011. The focus of the article is on the first deployment of the new limb-imager GLORIA, here operated in the chemistry mode, and on the opportunity offered by the comparison with the MIPAS-STR conventional limb sounder to evaluate on the field the innovative capabilities and performances of GLORIA. As properly pointed out by the authors in the introduction, the work makes a substantial contribution in the context of an on-

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Interactive
Comment

going process of development and consolidation of an instrument belonging to a novel generation of atmospheric FTS. A valuable piece of information added by the results of the comparison is the demonstration of the improvements made by GLORIA in terms of horizontal cross-track sampling and vertical resolution.

The quality of GLORIA Level 2 data is evaluated for a number of atmospheric targets simultaneously observed by MIPAS-STR, including temperature, HNO₃, O₃, H₂O, CFC-11 and CFC-12. Validation of a subset of these products is also available from comparison against correlative measurements acquired by the in situ payload aboard the Geophysica aircraft: H₂O by the commercial Rosemount sensor, total water by FISH, CFC-11 and CFC-12 by HAGAR.

The paper is well-written and organized and the main outcome of the first validation exercise on GLORIA data are presented in a compact manner with adequate technical details if regarded, as previously specified, in the context of an on-going work, which is already planning for further improvements and testing.

I do not have any major remarks and I recommend the publication on the journal in consideration of the impact that the research work presented by Woiwode et al. might have in the current scenario of atmospheric remote sensing in Europe. Development, deployment and validation of new limb measurement capabilities of atmospheric temperature and composition is, indeed, especially relevant for the lack of operating or planned spaceborne observation after the end of the ENVISAT mission.

Technical corrections/minor changes I suggest to the current version of the paper before publication are listed herebelow:

- page 2, line 8: change “in-situ” to “in situ”;
- page 3, line 8, change “aims: The” to “aims: the”
- page 4, line 27, use a consistent spelling with page 6, line 25 (“nonlinearity” vs “non-linearity”)

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- page 5, lines 16, 20 and 21: change “a-priori” to “a priori”;
- page 5, line 31: “avoid” might be replaced by “minimize”, “limit”, “reduce”;
- page 8, line 28: change “AltitudeGas” to “Altitude Gas”;
- page 8, line 30: change “due the fact that the both the” to “due to the fact that both the”;
- page 9, line 16: change “due a higher” to “due to a higher”;
- page 12, line 5: why “unique”? Isn’t it better “first” (in particular, if we consider that at the end of the Conclusions section the authors highlight the fact that “a further simultaneous airborne deployment of the two instruments would thus be extremely helpful to check . . .”)?
- page 16, line 24: change “in- situ” to “in situ”.

Interactive comment on *Atmos. Meas. Tech. Discuss.*, 7, 12691, 2014.

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