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Comment

## ***Interactive comment on “Instrument concept of the imaging Fourier transform spectrometer GLORIA” by F. Friedl-Vallon et al.***

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### General comments

This paper presents a new instrument designed for measurements of the Upper Troposphere and Lower Stratosphere from research aircraft, to study either the chemistry or the dynamics of the Earth atmosphere. Hence, it fits very well within the scope of AMT. The instrument described has already participated in a significant number of observation campaigns which proved the validity of the novel concepts that have been implemented. The paper is of very high quality and presents these new ideas clearly. I strongly recommend this paper for publication in AMT.

My main complaint about the paper is that it does not show a spectrum recorded during

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one of the campaigns. I suggest that a Figure be added showing an overall bandpass spectrum and one band detail, right after Figure 4.

The second complaint is that no mention is made of instrument line shape (ILS) retrieval. This should be added to Section 4.

#### Specific comments

Page 2304, line 10, should mention the IASI instrument. Many references can be found here: [http://smc.cnes.fr/IASI/A\\_publications.htm](http://smc.cnes.fr/IASI/A_publications.htm)

Page 2305, line 11 and line 21: I would swap the order of these two paragraphs, given that it makes more sense to mention the overall scientific interests before going into the details of the requirement Table. This swap may require some re-wording of the sentences.

Page 2310, line 19: "Typical frame rates are in the 3-6 kHz range, depending on the size of the chosen sub frame." The paper must mention the size of these sub frames. With 8 outputs and 10 MHz clock, one can at best output 80 M pixels per second, and probably less if there are dead times at line or frame boundaries. Also, array reset and integration time may happen sequentially with the reading. But even keeping the optimistic 80 M pixels per second, one can read only 13333 pixels at 6 kHz frame rate and that is less than a quarter of the full 256 x 256 array.

Page 2310, line 20: please mention frame integration / reset times and if these happen in parallel or in sequence with frame readout.

Page 2311, line 1: "since full integration time efficiency of the detection system can be reached at the chosen operating temperature". I believe that the effect of a warmer instrument would be to increase the amount of thermal background signal on the detector (some modulated by the interferometer, some not). And so the criterion for the instrument temperature would be that the thermal background signal is sufficiently lower than the signal from the atmosphere to not contribute too much to the photon noise.

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## Technical corrections

Page 2303, line 25: since more than three decades → for more than three decades

Page 2304, line 4: The majority of these instruments scans → The majority of these instruments scan

Page 2310, line 24, I don't understand: "and carbon dioxide snow evolves."

Page 2310, line 29: not have led to an additional significant increase → not have led to a significant increase

Page 2311, line 10: has been required → is required

Page 2313, line 7: On ground, → On the ground,

Page 2313, line 10: an optional in-flight operator → an optional in-flight operator computer

Page 2313, line 24: derived in a pre-processing from atmospheric signatures. → derived from atmospheric signatures in a pre-processing step.

Page 2315, line 13, I don't understand: "resolution of T1279"

Page 2324, Table 1, I think "0.8 to local horizon" should be "0.8 above local horizon". Or this wording is unclear to me.

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 2301, 2014.

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