

Interactive comment on “Level 0 to 1 processing of the imaging Fourier transform spectrometer GLORIA: generation of radiometrically and spectrally calibrated spectra” by A. Kleinert et al.

Anonymous Referee #4

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1 General Comments

This paper gives an introduction to the calibration of GLORIA. Several aspects are explained in good detail and with good reasoning. However, the uninitiated reader (who does not know a lot about FTS instruments) will have difficulties to understand the paper. In my opinion there are two main reasons for this:

1. Several aspects are not explained to a level that allows the reader to follow the author's reasoning. Ideally, I would expect first a short introduction of the mea-
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surement principle, then the basic instrument characteristics and following from this an overview of the calibration that has to be done to convert instrument units to physical units. Some of this is presented in the paper, but in my opinion not in sufficient detail.

2. The structure of the paper makes it difficult to follow the reasoning. Calibration aspects are partially described in sections 3 and 4 (radiometric and spectral) and partially in section 5 (phase, spikes).

If more detail is out of scope for this paper, it should at least be re-structured. A concise introductory paragraph that explains all the instrument effects that must be corrected would help the reader to follow the more detailed aspects of the calibration later on. The processing aspects should not be mixed with additional calibration aspects (e.g. phase correction and spike correction).

2 Specific Comments

2.1 Abstract

- line 7: “..the detector has a usable range of 128 x 128 pixels” I find the word range in this context confusing, maybe a better term would be “usable *area* of 128 x 128 pixels”

2.2 GLORIA instrument and data acquisition

- page 2831, line 20: “the shorter interferograms [...] enable higher horizontal sampling” This statement is unclear to me. I understand that the shorter integration times lead to higher sampling, but why horizontal? The spatial sampling for

one image is determined by the detector as I understand it. Is the field-of-view scanned horizontally during one observation, i.e. do you have a measurement at one azimuthal position, then move the field-of-view and then you take another measurement and so on? What is the measurement strategy for one flight?

- page 2832: Suggestion: it might help the reader if you could provide a drawing of a cuboid with axis description

2.3 Radiometric calibration

- page 2833, line 10ff: A systematic discussion of the contributors to the offset is missing. I would expect that the "typical" contributors are mentioned, such as self emission of the instrument, read-out noise, memory effect (after images) etc. Even if they do not play a role, this should be said.
- page 2836, line 10ff: The determination of the non-linearity (NL) lacks some essential details:
 - The underlying assumption of the NL determination is that it is independent of the integration time. Was this checked? If there is also a time dependent component (as was seen for similar detectors and readout chains), this would introduce a systematic calibration error, since the calibration sources atmospheric measurements are measured with different integration times.
 - Could you describe in a sentence or two how the linear reference ("virtual detector") was chosen? Did you keep the correction minimal for the typical measured signal level or did you choose the start of the measured curve or something else?
 - Did you ensure during the NL measurement that intensity variations of the radiance source do not have an impact on your result (by e.g. a measurement sequence short times -> long times -> short times)

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- Since you check the NL correction quality with "out-of-band artefacts" and even show a figure, I think the basics of the method should be *shortly* described, a mere reference is not enough in this case.

2.4 Spectral calibration

- page 2841, line 1: The sentence "In this dataset, the position of a certain spectral line [...]" should be, I assume "In this dataset, the *apparent* position of a certain spectral line [...]"
- page 2841, line 4: "The interferogram is zerofilled." What does this mean? Is the grid made artificially more dense? Under what circumstances is this allowed?
- page 2841, line 9: Why don't you use a harmonic fit to determine the maximum? Is this for computational speed reasons?

2.5 Processor optimisations

- page 2851, line 12: "Cache misses" are not explained.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 2827, 2014.