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Atmospheric Measurement Techniques Discussions

Interactive comment on "New calibration noise suppression techniques for the GLORIA limb imager" *by* T. Guggenmoser et al.

Anonymous Referee #2

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Overview: the paper describes some techniques applied during L1 processing of spectra from an imaging infrared FTS instrument. The aims are to use the expected inter-pixel uniformity in measured spectra obtained from calibration views to suppress the impact of noise in deriving gain and offset values.

The first technique consists of fitting a smooth function to the radiometric offset values. The shape of this function - a pseudo-hyperbola - being determined ad hoc given the observed spatial structure.

The second technique consists of applying singular vector decomposition to the set of calibration spectra from all pixels, and reconstructing the spectra using a reduced set of singular vectors. This is expected to have an advantage over simple low-pass filtering

in that there is no assumption about 'noise' always being at the higher frequencies. This seems particular significant for the deep space spectra which are contaminated with residual atmospheric emission features.

It is suggested that the above can be applied to the calibration of any imaging spectrometer, however I suspect that the individual characteristics and quirks of each such instrument will require tailored solutions with only marginal reference to this work. Even so, as a document describing the calibration of GLORIA, the paper merits publication. I have only minor questions and suggestions.

General question: It is not clear why the same technique is not applied to the radiometric gain which, in Fig 3, also seems smooth. Is it because some genuine pixel-pixel variability is expected in gain unlike radiometric offset?

Specific comments and suggestions:

p12659, l25: 'instrument radiative background' (implying that there are various radiative background contributions, of which the instrument's is one) seems better than 'radiative instrument background' (implying various instrument background contributions, of which the radiative is one).

p12665, Eq 14: here you use P to represent the number of eigenvectors in the reconstruction, although in Eq 8 it was pˆ0. In any case it is difficult, particularly with this font, to distinguish between the upper and lower case p and P values in the summation terms. Might I suggest using a completely different letter indicate the number of reconstruction eigenvectors in both equations?

p12665, Eq 14: A second quibble about this expression is that starting the summation from 0 when counting matrix elements seems wrong.

Fig 1 caption: the last sentence, referring to earlier analysis, doesn't make much sense here. I suggest just deleting it.

Fig 2: the '1e-6' and '1e-7' are a bit cramped. Presumably these are scaling values for

the colour scales? It might be better to incorporate these into the y-axis captions on the right of the plots. Similarly Figs 3, 4

Fig 2: not clear what the two numbers +9.7e-8 in the middle of the plot refer to. Similarly Figs 3, 4.

Fig 3: unclear what "AU-1" means. Arbitrary Units? (in which case why have any units at all?). AU also appears for y-axis radiance in other figures.

Fig 6: I suggest using a dotted or dashed line to indicate '0', to distinguish it from the 'original' spectrum. Similary other figures.

Fig 7: title 'real' missing from above the top panel.

Fig 12: I assume these are DS spectra (from similarity to Fig 6)?

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 12649, 2014.