Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC4
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Comment on amt-2021-121

Anonymous Referee #3

Referee comment on "Introduction to the ringing effect in satellite hyperspectral atmospheric spectrometry" by Pierre Dussarrat et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-121-RC4, 2021

The manuscript *Introduction tom the ringing effect in satellite hyperspectral atmospheric spectrometry* by Dussarrat et al. addresses artefacts commonly and intrinsically occurring in Fourier transform spectrometers. The authors present their mathematical derivation and simulated examples of the effects caused by non-ideal spectral filter responses and the effects caused by etalon filter in the optical path of the instrument.

The authors did not adequately review the state of the art on both effects, which is immediately obvious to knowledgeable readers looking at the reference list and subsequently reading the manuscript. The first effect is a classical signal processing and filtering case-study commonly addressed in textbooks. The application of this case-study on Fourier transform spectrometry without a demonstration based on real data does not warrant a publication in itself. Specificities of this effect in the context presented by the author have not been thoroughly discussed. The derivation seems correct, but is at times unusual and awkward for the reader, perhaps because it is specifically related to processing methods not discussed in the manuscript. Some assumptions made in the derivation are not self-evident and their limits should be discussed or properly referenced.

The second effect, radiometric errors related to Fabry-Perrot filter, is very well known and thoroughly studied, modelled and observed. The authors did not present any compelling arguments for their derivation of this effect and why this radiometric error source requires revisiting. Moreover, the authors failed to acknowledge the considerable amount of prior work on this regard.

A recurring discussion point is the assumed lack of consideration for these effects in the past and a renewed need to address these effects for hyperspectral atmospheric spectrometry. It remains unclear to the reader on what both these assumptions are based and why it is different or more relevant in the context presented by the authors. A discussion on the limitations of the already existing mitigation methods and why (and when) those apply differently for atmospheric hyperspectral measurements could provide a better contribution to the journal. The provided example is well presented, but only

considers a numerical apodization as a mitigation approach and does not address the state-of-the-art methods used in processing and data analysis methods. Processing cost is also argumentatively used, without any basis.

Some of the content could be suited as part for the future paper the authors mention in their concluding remarks. The derivation presented (and especially the assumption therein) should nevertheless be thoroughly revisited and presented with more rigor with regards to the assumptions.