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Reply on RC4

Pierre Dussarrat et al.

Author 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-AC3>, 2021

Thanks a lot. Please find our answer:

1) As also discussed with referee 1 (section 1), different kinds of ringing effects, related to instrument physics but also to processing artefacts, occurring in FTIR spectra are quoted as such in literature. To clarify the purpose of our paper and to avoid any confusion, we propose to include the discussion of the ringing terminology and to clearly identify the effect we are addressing, throughout the entire paper (title, abstract included), with the original term "Calibration Ringing" in replacement of the admittedly misleading and ambiguous term "Ringing".

2) We intended to write this paper because this topic has been discussed recently with several collaborators and we failed to find any pedagogical approach in the literature. Thus, we found it useful to first introduce theoretically the issue in preparation of its correction or mitigation. However, we may have missed the state of the art having, for example, not the right vocabulary, therefore we kindly ask the referee to point us toward a reference.

3) As also discussed with referee 1 (section 2), to our knowledge "Calibration Ringing" was not considered since long ago, as its effect was generally negligible in past EO missions based on spaceborne IR interferometry.

We see two reasons why this is changing:

- Increasing radiometric requirements (in particular radiometric accuracy) and increasing NRT processing requirements.
- Advent of more and more sophisticated FT spectro-imager concepts, acquiring simultaneously up to thousands of interferograms with considerable spatial coverage.

While "Calibration Ringing" becomes a more and more critical contributor to the radiometric error budget, its handling, if uncorrected, requires the radiometric transmission to be explicitly considered by users of the calibrated L1 radiance product. In practice, this means that each detector of a spectro-imager has to be processed as a self-standing instrument (eg. for fast radiative transfer models), which is considered as unfeasible by the user community, all the more in view of NRT processing (and the

potential need to update relevant instrument characteristics in case of temporal instability).

The user requirement to process FTIR measurements independently of any detector dependent instrument characteristics is thus further enhanced for multi-detector FT instrument concepts.

To clarify this point, we propose to introduce a short discussion about the inclusion of SRF distortions in the L2 applications in parts 1 and 2.2.