

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-43

Anonymous Referee #3

Referee comment on "Retrieval of greenhouse gases from GOSAT and GOSAT-2 using the FOCAL algorithm" by Stefan Noël et al., Atmos. Meas. Tech. Discuss.,
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The updated FOCAL retrieval (v3) is presented in this paper. It can process GOSAT and GOSAT-2 data. It has improved capabilities, mostly bigger spatial coverage than its predecessors, new molecular species measured and new processing. It can measure CO₂, CH₄, H₂O, HDO, CO and N₂O.

The paper is well written and well presented, and, as such, deserves publishing. Some minor comments would improve the readability of the paper.

Unfortunately, it has been written in a manner that serves solely as a reference, since most of the content are references to previous papers. It is therefore very dull to read and has very little "information" apart from some uncertainty figures, specially for someone outside of the field. Since the style of the paper cannot be modified substantially because this would mean a huge effort, I suggest to include the following additions:

- It should be stated, in the abstract, the beginning and in section "3.2 Processing" whether the uncertainties of the retrievals are determined. A great emphasis is placed on the amounts derived, but very little in the uncertainties. Are the uncertainties for each individual "pixel" determined? Or can a global uncertainty figure be derived?
- In line with the previous statement, include a sentence or two describing, in general, the algorithm used for pre-processing, processing and post-processing. Is it something similar to a linear regression? Non-linear regression? Machine learning? Optimal estimation? Please include some phrases such that the reader does not need to read one or two other papers to understand in general terms how the retrieval works.

- In the conclusion, for a reader outside from this field, it is not known whether these retrievals will make a difference in the community or not. Do they satisfy the requirements to geographically locate the sources and sinks of CO₂? CH₄? Do they satisfy some requirements that can be useful to the community? Can they be assimilated in an AC numerical model? If not, which requirements would be needed in future instruments? In summary, a paragraph to show that this work is useful for humanity and not just for the machines that are being fed the numbers.