

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-98

Anonymous Referee #2

Referee comment on "Comment on "Synergetic use of IASI profile and TROPOMI total-column level 2 methane retrieval products" by Schneider et al. (2022)" by Simone Ceccherini, Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-98-RC2>, 2021

The main purpose of this paper was to prove the equivalency of two methods in previous literature, Schneider et al. (2021) and Ceccherini et al. (2015). Overall, this work does a good job in doing this and the mathematical derivation in Section 2 is sound. The manuscript could use additional information that would be useful for the reader - the background and conclusions can be slightly extended to better express why this study is significant. I provide some suggestions below that would be beneficial to implement in the paper. However for the most part, the quality of the pre-print is good, and with a few minor edits I would recommend it for publication.

Specific comments:

Introduction: It would be helpful to more clearly state the significance and motivation behind proving the equivalence of the two methods. I understand this is mostly a technical study but it would good for the reader to know the scientific implications of the derivation.

Introduction: A few sentences that summarize the retrieval techniques and how they works would be useful to set the background behind this study.

Section 2: Define F_1 and F_2 and F_i in the equation (Eq 5 and 6). Was not completely clear to me what the relationship between those variables are. Also a sentence describing the physical meaning behind the key equations would be helpful (for example Eq 1, 5 and 15).

Conclusions: The main point of the paper was proving the equivalence of the two methods which shows the similarities between them. Is there any fundamental difference between them? If possible, it would be useful to also mention some advantages of using one method over the other when performing satellite retrievals.

Technical corrections:

Line 14 and Line 17: Spell out the names of the sensors where abbreviations are used for the first time. i.e. TROPOMI, IASI, MLS...

Line 60-62: The sentence "However, the original CDF formula..." is a bit long. It can potentially be split into two sentences.

Line 64-65: The sentence "Case that corresponds to having singular matrices" was a bit confusing. Consider rewording this part.