I thank the reviewer for the useful comments. In the following, I answer the specific comments (included in "**boldface**" for clarity) and, whenever required, I describe the related changes implemented in the revised manuscript. Page and line numbers indicated refer to the original version of the Comment published on AMTD.

Anonymous Referee #2

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.

I will provide a revised version of the Comment with implemented the suggestions of the referee.

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.

In the revised version of the Comment, I added a few sentences at the end of the introduction that clarify the significance and the motivation behind proving the equivalence of the two methods.

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

In the revised version of the Comment, I added a few sentences at the beginning of the introduction that summarize the retrieval techniques and how they work.

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).

In the revised version of the Comment, I slightly modified the sentence that defines F_1 and F_2 and I added a sentence describing the physical meaning of these matrices. Furthermore, I added sentences at the end of the paragraphs including Eq. (1), Eq. (5, 6) and Eq. (15) describing the physical meaning of these equations.

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.

I have identified a significant difference of implementation in the case that we have to combine more than two measurements. In this case, the CDF has an advantage with respect to the Kalman filter method that I have described at the end of the conclusions in the revised version of the Comment.

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…

In the revised version of the Comment, I spelled out the names of the sensors.

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

In the revised version of the Comment, I split the sentence into two sentences.

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

In the revised version of the Comment, I deleted this sentence.