Author's response

Public justification (visible to the public if the article is accepted and published):
Both reviewers have indicated that the revisions have satisfied all of their concerns. Referee #4 suggests that the information in lines 607-619 of the response may be valuable context in the discussion. Therefore, if the authors wish to include this content, I have given the option to include it as a minor revision which will have an extremely expedited editor review.

We would like to thank the editor. Please, find below our responses to the Reviewers' comments and the details on how we address them in the new version of the manuscript.

Reviewer 4

The authors have satisfactorily addressed the mostly minor comments that I raised during my initial review of this manuscript. I would be completely fine with publishing the manuscript in its current state. The only *very minor* additional step to consider - is it worth including some of the content contained in lines 607-629 of the response document somewhere in the manuscript (perhaps section 5 as discussion or perspective content?). I really like this content since it adds valuable context. But I do not regard this suggestion as mandatory. I leave it to the authors' and editor's discretion whether it should be included in the final revised manuscript.

We would like to thank Reviewer #4 for his/her review of our paper and the suggestion provided.
In order to answer the reviewer's comment, the following statements have been added (Line 576, 576-589 in the revised manuscript):
Recently, several MW-based snowfall retrieval algorithms have been developed, but HANDEL-ATMS is the only one tailored for high-latitude regions. Algorithms developed for the GMI onboard GPM-CO, based on machine learning techniques and on the use of CPR 2CSP as reference (e.g., Rysman et al, 2018, Rysman et al, 2019), do not retrieve snowfall at high latitudes, and therefore a direct comparison with HANDEL-ATMS can not be carried out. Other snowfall retrieval algorithms based on ATMS observations (e.g., Kongoli et al, 2015, Meng et al, 2017) are trained over specific geographical areas (the Continental US region) and are not representative of the extreme, high-latitude environmental conditions, therefore a comparison with HANDEL-ATMS could be not very significant. In another study by You et al, 2022 a retrieval algorithm for ATMS, trained using the CPR 2CSP product and based on logistic regression methods, provides snowfall retrieval only over specific background surfaces - ocean, sea ice, and coastal areas. However, it is interesting to observe a qualitative consistency with HANDEL-ATMS. The two algorithms show higher statistical scores over open water (ocean) with respect to sea ice or coast and better detection capabilities in presence of higher SWP/SSR values. A quantitative comparison between SLALOM-CT and HANDEL-ATMS is presented below, since both algorithms are based on a machine-learning approach and are trained on a global ATMS-CPR coincidence dataset.

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