Response to Referee's Comments:

We would like to thank the Editor and the Referee for the time and efforts handling and reviewing our manuscript. The constructive comments and suggestions were very helpful to improve the manuscript.

The Referee's original comments are formatted in black, while our point-by-point responses are formatted in **blue** font. All the corresponding revisions in the revised manuscript are indicated in **red**.

Comments Referee #1

I appreciate the authors' efforts in addressing the reviewer comments/suggestions. The manuscript is now greatly improved, and I have just a few minor comments before I think this paper can be published.

Thank you very much for your helpful comments and suggestions.

1. I appreciate the clarification of the manuscript's aim of evaluating satellite retrieval algorithms in the introduction and conclusion sections. This aim should be made clearer in the abstract as well.

The sentence "……*Moreover, passive satellite retrieval algorithms and cloud products were evaluated to identify whether they can detect cloud microphysical and thermodynamical perturbations*……" has been added in line 28 to 30 in the clean version of the revised manuscript to emphasize our aim in the abstract.

2. Regarding the comparison between SEVIRI_ML and CLAAS-2, I understand that SEVIRI_ML performs better because it can mask out points with high uncertainty, and this point has been made clearer in the revised manuscript. Is it possible to say anything about which pixels are being filtered out/tend to have higher uncertainty? For example, are they the pixels occurring close to cloud top/edge, or pixels around the mixed phase

region, etc.? This would be a more valuable and more broadly applicable insight.

We carried out a corresponding analysis with the result that filtering of pixels with high uncertainty is spatially rather randomly, thus unfortunately we could not find any pattern that would allow a general statement in this regard. We have included the following sentence in line 561 to 563 in clean version of the revised manuscript: "*……more than 90% of the pixels are filtered out. The filtering affects pixels rather randomly, thus we could not identify any patterns of pixels, such as cloud edges, that are primarily affected by the filtering. ….*"

3. Authors should include the discussion of perturbation in thermodynamics vs. INP concentrations (they can paraphrase from the last paragraph of their response to my first major comment) in the text. The end of section 3.5 would be an appropriate place to add this.

At the end of section 3.5, a paragraph has been added to compare the impacts between perturbation in thermodynamics and INP concentrations. Line 604 to 612 in the clean version of the revised manuscript: "*……Compared to the INP perturbation, the impact of thermodynamical perturbation on cloud phase distribution is significantly stronger within the cloud (Figure 8a and Figure 10a). At the cloud top, the effect of perturbation in thermodynamics on the cloud phase distribution is as large as the largest INP perturbation (case A×103). Moreover, the impacts of thermodynamical perturbation on domain-averaged profiles of cloud hydrometeors and process rates related to the ice cloud process are also significantly stronger than the INP perturbation. Thus, the thermodynamical perturbation is stronger than the INP perturbation when the entire depth of the cloud is considered. Overall, perturbing initial thermodynamic states or CAPE of convective clouds is as important as and may even stronger than the modifications to cloud heterogeneous freezing parameterizations ……*"