

Atmos. Meas. Tech. Discuss., referee comment RC2 https://doi.org/10.5194/amt-2021-306-RC2, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

## Comment on amt-2021-306

Anonymous Referee #2

Referee comment on "Synergistic radar and sub-millimeter radiometer retrievals of ice hydrometeors in mid-latitude frontal cloud systems" by Simon Pfreundschuh et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-306-RC2, 2021

This study develops a new retrieval algorithm combining radar with passive millimeter and sub-millimeter observations for the estimates of ice hydrometeor distributions. The retrievals are validated using the observations from aircraft measurements, which provides confidence on the method. This work is very important for the satellite community and for the preparation of ICI. The paper is well written, and I enjoy reading it. I only have several minor questions/comments.

Lines 69-71. It may be helpful to add the time periods of these campaigns in the text or in the table.

Line 100. It seems that you do not have the same measurements to perform the retrievals for different flights. How is the missing information handled in the retrieval method?

Figure 10. The discrepancies are quite large for 243 GHz channel for flight C161 compared to the other two flights. Could you comment on that?

Lines 220-222. As you also mentioned, the largest uncertainties correspond to the higherlevel clouds where we have smaller ice particles. Are these uncertainties also related to the lack of representativeness of the particle shape/type used in the models?