

The paper is well written and contains nice results in terms of ice properties in mixed phase clouds and ice production derived from cloud radar observations. I have a small list of suggestions to improve the paper.

Only minor revisions are required.

Title: Two-year statistics... is more appropriate... (Feb 2018 to April 2020)

P1, l2: remote sensing IS an observation. So, remove 'observation' here, please.

P1, l9: that that

P1, l15: Please use 2 K (and always Kelvin for the temperature difference throughout the paper)

P2, l1: provide a reference please

P2, l3: I am a bit confused..., dust particles (mineral dust) are about three orders of magnitude better INPs than marine particles (sea salt) at the same temperature. Please check, McCluskey (JGR 2018, Fig 8 (marine) vs Niemand 2012 (dust) similar to DeMott, 2015, dust).

P3, l31: What is the LDR decoupling of the system? It would be interesting what is the minimum and maximum LDR that can be detected within these clouds for the usual ranges of Z, Signal and LDR.

P4, l10: The website is depreciated, now it is cloudnet.fmif.fi .

Further remark: For ACTRIS/Cloudnet datasets DOIs are available. Please refer to the specific dataset that was used in this study with such a DOI.

P4, l30: Here, the Myagkov (2016) references would be appropriate to be included:

Myagkov, A., Seifert, P., Bauer-Pfundstein, M., and Wandinger, U.: Cloud radar with hybrid mode towards estimation of shape and orientation of ice crystals, *Atmos. Meas. Tech.*, 9, 469–489, <https://doi.org/10.5194/amt-9-469-2016>, 2016.

Myagkov, A., Seifert, P., Wandinger, U., Bühl, J., and Engelmann, R.: Relationship between temperature and apparent shape of pristine ice crystals derived from polarimetric cloud radar observations during the ACCEPT campaign, *Atmos. Meas. Tech.*, 9, 3739–3754, <https://doi.org/10.5194/amt-9-3739-2016>, 2016.

P5, l3: Again a reference to Radenz et al. (2019) would be appropriate here.

P5, Figure 1 (c), this third peak (the last one to the right) indicates the presence of liquid water. Could the columnar ice particles actually have been produced by primary ice formation in this liquid layer and not be a product of ice multiplication?

P7, Figure 2(b): These statistics are highly questionable. What do they show us? Is ICON able to derive actual realistic humidity values for the clouds under study? Did ICON even resolve the clouds under study?

P10, Figure 6(a): The figure seems to contain mixed-phase and ice clouds. Would it be possible to show both species in this figure separately?

P10, l18: Again, using unit Kelvin (...10 K) is really important here to differentiate between temperature differences and absolute temperature values.

P11, Figure 7 (d): Are the LWP values reliable if precipitation (especially rain) reaches the ground? It is known that microwave radiometers have a problem with such conditions - is that also true for the radar-derived LWP?

P16, Section 5: This chapter is rather speculative and does not show a conclusive result.

- N_{needle} should be computed taking into account that the size of needles is distributed spectrally. (I think the term "characteristic needle" points to this fact.)

- An error analysis is necessary here. What is the impact of residual measurement errors in fall velocity on the ice crystal number concentration?

- INP is compared against ice number concentration: A thorough error analysis for both values is needed.

- How is ambient INP concentration over the measurement site derived?

P19, l10: The last sentence of the paragraph is not clear, please explain in more detail. "For many cases" is a bit blurry.