

Review of revised manuscript by Umo et al., 2019:

General comment:

The manuscript is strongly improved and the readability increased. I recommend publication after the following minor revisions.

Specific comments:

Page 2, line 24: It is questionable whether ice-filled pores should be termed active sites, since active sites are considered to consist of a material different from ice. Also, growth of ice on ice should not be considered a nucleation process. Please revise the formulation.

Page 3, lines 30 – 32: This sentence needs to be formulated better. It should become clear that the first statement refers to immersion freezing experiments and it should be explained what is meant by "hydratable components" (their origin and composition).

Page 4, lines 19 – 20: Can you specify the CaO content of classes C and classes F CFAs?

Page 6, lines 26 – 27: is this a correct definition of ice-activated fraction? Shouldn't the division be through the sum of all particles/droplets/crystals present in the chamber?

Page 6, lines 33 – 37: there are 3 panels in each row. It should therefore read: top panels represent ... middle panels show ... bottom panels show...

Page 6, lines 35 – 36: do you really mean that the freezing experiment was stopped and not just the expansion?

Page 7, line 16: "we discuss" instead of "we discussed".

Page 7, lines 21 – 22: this sentence reads as if the 0.19 % of the particles all nucleated at 244 K, Do you really mean this or not rather that about 0.19 % of the particles had nucleated ice at 244 K?

Page 7, line 23: the same issue again: do you mean "had increased..."?

Page 7, lines 27 – 28: can you give the value of the homogeneous freezing temperature that you measured in your experiments?

Page 7, line 30: why a difference of 8 K? $245\text{ K} - 228\text{ K} = 17\text{ K}$, or to which numbers do you refer here?

Page 8, line 3: Either give the abbreviation of ice-activated fraction or write it out but you do not need to do both every time you mention it.

Page 8, line 20: is it only the size of the particles or also their number that is different? In drop freezing assays there are usually very many particles per drop.

Page 8, line 34: First was the size discussion, the aerosol composition is rather "second", and the measurement techniques "third". Consider to revise.

Page 8, line 36: Isono and Ikebe (1965) and Mason and Maybank (1958) are rather old references for this statement. Consider to add more recent ones.

Page 9, line 5: Consider to replace "behavior" by "activity".

Page 9, lines 21 – 31: The sequence of experiments is confusing. Table 2 suggests that the experiment with $T_{\text{start}} = 254\text{ K}$ is a new experiment. What is the history of this experiment? 250 K

→ 254 K → 264 K? If you did two such experiments, you might show the results of both in Table 2.

Page 9, line 28: Here you write that the same processed CFA_UK sample was warmed to 264 K, however, the previous section refers to a different experiment. Please make the history of the samples more transparent.

Page 10, line 10: could you mark the point where 244 K is reached in the figure e.g. with an arrow? This would increase the readability of the manuscript.

Page 10, line 27: again, could you mark the point where 246 K is reached in the figure?

Page 11, line 38: "be plerospheres" instead of "have plerospheres"

Page 12, lines 29 – 31: this sentence could be formulated better. Do you mean "processing" instead of "process"?

Page 13, line 14: "with which" instead of "that"

Page 13, line 12: "inherently expected" sounds strange. Try to improve formulation.

Page 13, lines 13 and 14: "than" instead of "that"

Page 13, line 24 – 25: "CFA will only show considerable or no ice nucleation potential." I do not understand the logics of this sentence. Please improve.

Page 13, lines 35 – 37: Relying just on pore volume and specific surface area is dangerous because the diameter is very relevant for pore filling and ice melting.

Figure caption to Fig. 1, line 5: consider to replace "irrespective" by "despite".

Figure caption to Fig. 2, lines 2 – 5: improve formulation.