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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Direct evidence for secondary ice formation at around –15 °C in mixed-phase clouds" *by* C. Mignani et al.

Anonymous Referee #2

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Thanks for providing more information about these experiments. However, authors do not address the concerns that are outlined. I will describe one example here. One of the conclusions of this study (page 5 main paper) is that if no INP was found in a crystal – this crystal was categorized as formed through the process of secondary ice formation. This is based on an observation that this particular crystal (now supercooled droplet) did not freeze until -25C. However, it is possible that this droplet may freeze at colder temperatures than -25C, and if the composition is made up of dissolved organics/inorganics, the droplet may require homogeneous freezing temperatures (< -37C). This possibility is not explored in this study. How to assure that this crystal (or supercooled droplet) is free of any residue/foreign substance that may trigger nucleation of ice? If the droplet could freeze at < 25C temperatures, then conclusions will change.

To verify this possibility an experimental evidence is needed. In response (page 3), it is mentioned that "A possible explanation for the absence of INPs are crystals formed through secondary ice formation processes.", but this is a conclusion which is drawn in this paper based on limited observations, not an explanation. Further, papers from the literature are highlighted saying that low INP concentrations compared to N_ice concentrations are observed previously, but this response does not answer the above question. There are no results regarding the nature of INPs or the freezing spectra of droplets at colder temperatures to understand this concern. My all other questions are somewhat related to this concern. Additional experimental evidence (for example as above) is needed to support the claims made in the paper.

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