

Interactive comment on “Effects of atmospheric conditions on ice nucleation activity of *Pseudomonas*” by E. Attard et al.

Anonymous Referee #1

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The manuscript by Attard et al. describes the results of laboratory experiments with selected strains of *Pseudomonas* bacteria, which produce an extracellular ice nucleating (IN) protein. The authors examined the efficiency of the IN activity of these strains under different conditions that are relevant for the cloud environment such as acidic pH, increased oxidative and UV radiation stress. They found that pH has significant effects on (decreasing) IN activity while oxidative agents and UV showed no effect or the effect was strain-specific. The experiments seemed to be robust and rigorously executed. Therefore, the paper addressed one important question related to the influence of airborne bacterial cells on aerosol:cloud:precipitation interactions. This reviewer did not find major issues with the manuscript. Only a few minor points were identified for the authors to consider.

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1. Most of the text in the two first paragraphs on page 4 is not directly related to the main thesis of the manuscript (e.g., discussion of inorganic IN particles) and thus can be deleted without loss of clarity.
2. The description on the methods to account for the potential IN effect of the buffer of the medium used for pH testing (lines 0-15, page 8) is not very straightforward and could be re-written to be more accessible to the average reader. Related to this, can *Pseudomonas* grow on the buffer (acetate) and thus alter the pH (or the growth is too slow to have a significant effect)? Finally, will it be easier to perform a control experiment where no bacteria are added to quantify the effect of IN of the buffer/medium alone?
3. Line 6 page 11. I think the authors meant to write “for the temperature range tested” (as it is written is not grammatically correct).
4. Page 14 and elsewhere. Could the authors provide a reasonable explanation why the effect of pH on the IN activity is temperature dependent? It might be related to the effect of temperature on the growth of the organisms (slowing down growth and thus IN production and activity).
5. In general, it will be useful to mention how many biological replicates were performed for each experiment and what variation was observed among the replicates. Replicates are mentioned only for one set of experiments, I think, and in this case the variation may be considered too high to allow for robust conclusions to emerge, as the authors also indirectly implied.
6. In the figures, the fonts on the axes could be enlarged to be easier to see. Not clear what “ns” means. The name of strain *P. syringae* cc0242 is not spelled out consistently; please use always capitalized “CC” or lower case “cc” in the text and figures.

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