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Interactive comment on “Survival and ice nucleation activity of bacteria as aerosols in a cloud simulation chamber” by P. Amato et al.

P. Amato et al.

pierre.amato@univ-bpclermont.fr

Received and published: 17 May 2015

We thank Referee 1 for raising weaknesses in the discussion manuscript. Our responses to each comment are indicated below.

Specific comments: Referee#1: Introduction, page 4059: It is well explained why certain bacteria stains were used in this study, but I miss here the motivation to investigate the influence of sulfates. Response of the authors: a precision indicating that these were “as surrogates for the presence of anthropogenic aerosols” was inserted in the text after “sulfates” (line 98 of the revised manuscript).

Referee#1: Material and methods, page 4061, line 23: It is not clear to me what “the frequency of INP per cell was > 2% etc.” means. If it means that more than 2% of the

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cells in the suspension were IN active shouldn't it be per total cells then? This would make more sense when reading the text. Why not use frequency of IN active cells as later used in the text (page 4069, line 27). Response of the authors: We agree that the INP mentioned actually refers to cells, so "INP" has been changed to "IN active cells" in this section.

Referee#1: Page 4063, line 6: It is written that in all cases clouds were generated. Can the authors explain why only in two out of 14 cases aerosol samples were collected after dissipation? Response of the authors: The number of experimental time points was limited due to practical reasons, notably the time needed for conditioning the chamber. Collecting more samples after cloud dissipation would have been interesting of course, but we had to compromise between (i) taking more samples before expansion cooling for investigating closely bacteria as aerosols and their impact on clouds, and (ii) focusing on the impact of clouds on bacteria by taking some samples after dissipation. We chose to give priority to (i), and still briefly approached (ii). We thought that the results obtained in (ii) were quite original and worth mentioning here, despite the fact that only a few samples were investigated.

Referee#1: Figure S1: The symbols are partly hard to distinguish e.g. Exp 10 and Exp 7 have both red lines? I suggest to also including the information in the legend that the temperature was reduced in Exp.8. Response of the authors: the color settings of the figure have been rearranged for better clarity. We did not find relevant to include the information that the temperature was reduced in Exp. 8 in particular, as we should then also indicate experimental details for the other Exp., and that these are already presented in Table 1. Rather, the information that experimental conditions are indicated in Table 1 has been included in Fig S1 legend as "Details about the experimental conditions used in each experiment are given in Table 1".

Referee#1: Throughout the manuscript: Why are IN active cells called sometimes INP and sometimes IN active cells? Can the authors clarify? Response of the authors: INP is for referring to the particle carrying the site at the origin of ice formation, disregarding

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its nature, while the term IN active cells refers to the phenotype of the bacteria in question. This is based on the recent terminology proposed by Vali et al. (2014), where it is recommended to use the term INP in all cases for atmospheric applications.

Other comments/typos: Referee#1: Abstract: page 4057, line20: space is missing in perm2 Material and methods, page 4061, line 7: it seems that a word is missing here: acted “as” cloud condensation nuclei. Page 4061, line 23: particle”s” or “an” ice nucleating particle? Results and Discussion page 4070, line 14: frequency of IN”P” per cell? Response of the authors: all these have been corrected

Referee#1: Figure 4 caption: “per total airborne cell” sounds odd, just per cell or airborne cell is good. Response of the authors: the word “total” has been removed here.

References cited: Vali, G., DeMott, P., Möhler, O. and Whale, T. F.: Ice nucleation terminology, Atmos Chem Phys Discuss, 14(15), 22155–22162, doi:10.5194/acpd-14-22155-2014, 2014.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 4055, 2015.

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