The submission by Augustin-Bauditz et al. describes a method for the generation of aerosolized insoluble solid particles mixed with soluble/water miscible organic substances, followed by a short laboratory study of the ice nucleating ability of such particles and a lengthy modelling study. Small ice nucleating particles and/or molecules (referred to as INM here and in the manuscript) of biological origin have previously been shown to in some way detach from their parent particle while in suspension. The finding that the artificial addition of these INM to mineral dust can significantly alter the ice nucleating ability of these particles is a strong support of previous studies that concluded the biological components of soil dusts enhance their ice nucleating behavior (e.g. Conen et al., 2011; O'Sullivan et al., 2014). However the amount of space dedicated to the separate parts in comparison with the abstract, introduction and conclusions results in the paper's emphasis being confusing, which I think should be redressed before publication.

Beyond the confusing paper emphasis, I have a number of minor comments/queries and technical issues, which are listed below.

Paper Emphasis:

The paper has a rather vague title and its main contents are split into three general parts – aerosol characterization, laboratory ice nucleation, and ice nucleation modelling, with characterization getting approx. eight pages, lab work approx. two pages and modelling work approx. six pages. However, there is no mention of modelling work in the abstract, no mention of characterization in the conclusions and no mention of either in the introduction. I would suggest two steps which would largely fix this:

1) Rework the abstract, introduction and conclusions. Give more emphasis towards the generation/characterisation of mixed aerosol, as this forms the largest part of the paper. Also cover the modelling work in the abstract, and perhaps move the introductory modelling material to the introduction. It should also be more clearly explained what the purpose of the modelling section is, as its conclusions are already fairly clear just from the three experimental datasets in figure 4.
2) Expand the breadth of the laboratory data included. Not only will this address the paper emphasis, but providing only one experimental dataset weakens the conclusions. For example, experiments with particles generated from a number different illite-BPWW mixing ratios or sizes would result in much stronger conclusions.

Minor Comments:

Throughout the paper there is a general assumption/presentation that the ice nucleating ability of INMs is superior to that of mineral dust. It is probably worth adding a clarifying statement somewhere that this is not always the case.

Page 29640, line 20. I think this statement is too strong. I recommend inserting the words an and could: It can be concluded that *an* INM located on a mineral dust particle *cloud* determine the freezing behavior of that particle.

Page 29641, lines 1-4. This sentence implies that the publication by Murray et al. did not study particles of 'atmospherically relevant sizes'. Not only did this review include data from atmospherically relevant particles, but until the discussion as to whether multiple-particles-per-droplet techniques are comparable to single particle techniques in terms of available surface area is

resolved, I would recommend avoiding such an implication. The individual particles used in such techniques are usually of relevant sizes.

Page 29641, lines 9-19. This section could do with more references. For example, but not limited to, Murray et al., 2012; Hoose and Möhler, 2012; O'Sullivan et al., 2014; Conen et al., 2011; Wilson et al., 2015.

Page 29641, lines 24-26. I think this statement is too general. At which temperature ranges? Dust from what sources? Surely these things have an influence. There already seems to be some consensus that desert dust and soil dust are different things.

Page 29642, lines 6-8. This needs many more references. Hiranuma et al is not the only NX-illite paper.

Page 29643, line 13. This works out to be 1/3 of the original mass of pollen. If such an amount makes it through the filtering, is it really realistic that it's just some released macromolecules and not fragments of pollen grains? In Pummer et al 2012, it's 2.4 % mass released into the water.

Page 29643, line 14. Please clarify the measure of mixing – volume of suspension or mass of suspended/dissolved material?

Page 29644, line ~12. Do you have any information about whether the mineralogy of the size selected particles matches that of the bulk?

Page 29649-29650 and elsewhere. I really don't think that the SEM section provides any useful results to the paper and I would strongly suggest removing it.

Page 29650, lines 1-3. If the BPWW from the mixed particles evaporated in vacuum, surely the pure BPWW particles should have evaporated as well?

Page 29650, lines 20-27. The thresholds used are not unambiguous, especially when the SPLAT data for the pure BPWW is considered. Please provide some additional comments/justification for the chosen thresholds.

Pages 29650-29651. Similarly to the SEM data, I don't really see how the addition of the SPLAT data improves the paper. The conclusion is just to ignore the SPLAT data and use the VH-TDMA data, which is a rather weak conclusion. Is there anything of any real importance to be said from the SPLAT data?

Page 29654, lines 1-3 and lines 18-20. I'm confused. Either these statements need to be clarified or they directly contradict each other. Is there one INM or two INM in BPWW? Also lines 18-20 feel very strong (especially considering that page 29655 lines 6-9 talk about how the current sample is different to previous). Is this fact, or just a conclusion that was consistent with the data?

Technical issues

Page 29640, line 6. Delete "e.g.,".

Page 29641, line 15. Please delete the double brackets )(.

Page 29642, lines 1-4. Please provide a reference.

Page 29645, line 12. Delete comma after RH.

Page 29646, line 12. Change netto to net.

Page 29648, line 16. Is VGF 0.57 as here or 0.56 as in Table 1?

Page 29648, line 20-22. Suggest deleting comma's after suggests and both, and changing "material or, in other words" to "material. In other words"

Page 29649, line 8. Illite not illit

Page 29649, line 14-15. Suggest starting the sentence with As, deleting "On the other hand,"

Page 29649, line 26. Please replace the word results with conclusions.

Page 29650, lines 18-20. Delete comments about unusable data, it's not important.

Page 29650, line 25. "Mentioned above". Please specify.

Page 29651, line 8. Suggest deleting comma after both, and also replacing "or, in other words" with "and"

Page 29651, line 21. Suggest deleting both commas.

Page 29652, line 3. Delete comma and als "in the" -> "For this the SBM version…"

Page 29652, line 18. A a.

Page 29654, lines 2-3. Please add a reference to the single INM statement.

Page 29657, line 3. Delete comma after both.

Page 29657, line 22. Change depended to dependent.

Page 29658, lines 8-9. Suggest deleting "we can confirm that". This phrase does not work with "possible".

Page 29658, line 14. Delete commas

Page 29658, line 16. Change a to an.

Page 29658, line 17. The section in parentheses is not easy to read. Better to replace the symbols with "of the contact angle". E.g. "mean and standard deviation of the contact angle"

Page 29658, line 23, Delete already.

Page 29658, line 24-25. Delete from already to conditions. i.e. "However, it was difficult to determine…"

Page 29659, line 1. Delete even.

Page 29659, line 4. Advice, not advices.

Figure 4. Consider reformatting the lines/symbols to make the chart clearer when printed in black and white.

Supplement: Please add y-axis labels to the figure and translate the table into English, specify in the table caption what data it refers to, and add a column for the bin sizes in the table.

Conen, F., Morris, C. E., Leifeld, J., Yakutin, M. V., and Alewell, C.: Biological residues define the ice nucleation properties of soil dust, Atmos. Chem. Phys., 11, 9643-9648, 10.5194/acp-11-9643-2011, 2011.
Hoose, C., and Möhler, O.: Heterogeneous ice nucleation on atmospheric aerosols: a review of results from laboratory experiments, Atmos. Chem. Phys., 12, 9817-9854, 10.5194/acp-12-9817-2012, 2012.
Murray, B. J., O'Sullivan, D., Atkinson, J. D., and Webb, M. E.: Ice nucleation by particles immersed in supercooled cloud droplets, Chem. Soc. Rev., 41, 6519-6554, 10.1039/C2CS35200A, 2012.
O'Sullivan, D., Murray, B. J., Malkin, T. L., Whale, T. F., Umo, N. S., Atkinson, J. D., Price, H. C., Baustian, K. J., Browse, J., and Webb, M. E.: Ice nucleation by fertile soil dusts: relative importance of mineral and biogenic components, Atmos. Chem. Phys., 14, 1853-1867, 10.5194/acp-14-1853-2014, 2014.
Wilson, T. W., Ladino, L. A., Alpert, P. A., Breckels, M. N., Brooks, I. M., Browse, J., Burrows, S. M., Carslaw, K. S., Huffman, J. A., Judd, C., Kilthau, W. P., Mason, R. H., McFiggans, G., Miller, L. A., Najera, J. J., Polishchuk, E., Rae, S., Schiller, C. L., Si, M., Temprado, J. V., Whale, T. F., Wong, J. P. S., Wurl, O., Yakobi-Hancock, J. D., Abbatt, J. P. D., Aller, J. Y., Bertram, A. K., Knopf, D. A., and Murray, B. J.: A marine biogenic source of atmospheric ice-nucleating particles, Nature, 525, 234-238, 10.1038/nature14986, 2015.