

Interactive comment on “Microbiology and atmospheric processes: the role of biological particles in cloud physics” by O. Möhler et al.

Anonymous Referee #2

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Review: Microbiology and atmospheric processes: the role of biological particles in cloud physics

General comments: This manuscript presents a broad overview of the current state of knowledge and significant questions relating to the role of biological particles as cloud condensation nuclei and ice nuclei in clouds. The manuscript does a good job of posing significant questions and pointing the way to future research directions. It will be a good starting place for those wishing to understand the current state of knowledge in this field.

Specific comments: The writing is sometimes a bit choppy, and the authors work a bit hard to justify the paper in the abstract and introduction. Avoid phrases like ‘It is

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well-known that..' and 'It is a well-established fact...', 'As a main result of...'. These can generally be completely omitted without any loss in meaning or content.

There are many cases in which the reference or meaning of the sentence was not completely clear to me. This may reflect my lack of specific background in this area, but I point these out for your consideration.

p. 2560, l. 21: '...the different nature of their...'; Different from what, and specifically in what ways? You note distribution, source characteristics and life cycle, but what are the specifics of these differences? More detailed information would be extremely helpful here.

p. 2560, l. 23: what specifically is meant by 'cloud-active properties'; Is this well-established terminology for CCN and IN activities?

p. 2561, l. 2: 'like aerosol particles of other origin'; What are the origins other than biological? Would be worthwhile to clarify at this point.

p. 2561, l. 11: Does 'primary biological particles'; have a formal definition?

p. 2561, last paragraph: be consistent with the use of Sects. vs. Sections. Either type it out, or abbreviate it, but use the same structure throughout.

p. 2566, l. 23: What is meant by 'ice nucleus measurements'; Is this size, density, some combination, or something else entirely?

p. 2566, l. 26: 'it is known that ice can originate from secondary processes involving interactions among ice particles or with water droplets. What are the secondary processes, and is this referring to origination of NEW ice droplets, or simply increases in the particle or crystal size for existing ice particles?

p. 2567, l. 1: what is meant by ice concentrations? Is this increases in number? size? volume? What are the units?

p. 2567, l. 5: What is meant by 'Ensemble analyses';?

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p. 2567, l. 11: Again, what is secondary ice formation, or secondary ice formation mechanisms?

p. 2570, l. 14-15. What does this mean: ‘...there exists only some indirect and modest direct evidence that ice nuclei predict ice formation in clouds.’; What specifically is meant by this? Reading this, I expected data that described the relationship between some specific measurement of ice nuclei as a predictor of ice formation. But the subsequent data discussed in the paragraph focus on cloud temperature as a predictor of ice nuclei concentrations, and altitude as a predictor. I guess this is the indirect part of the predictor. What would constitute specific direct evidence that ice nuclei predict ice formation in clouds? What would be the ice nuclei measurement that would be important to quantify as a predictor....and what are the reasons that we don’t have this information?

p. 2578, final line. ‘...establishing the connection has proven to be a rather...’. Clarify what connection specifically you are referring to here.

Technical corrections: p. 2564, l. 13: DROPLET rather than droplets. p. 2568, l. 4: MICRONS rather than micron p. 2568, l. 27: HAS BEEN SIGNIFICANTLY rather than has significantly been p. 2573 l. 27: omit THE immediately preceding Colorado State University p. 2574 l. 2: CANNONS not canons p. 2575, l. 12: ...so far HAVE addressed..

Interactive comment on Biogeosciences Discuss., 4, 2559, 2007.

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