

Interactive comment on “Abundance and viability of particle-attached and free-floating bacteria in dusty and nondust air” by Wei Hu et al.

Anonymous Referee #1

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The manuscript addresses a topic that is of interest to a range of scientific disciplines, as indicated in the Discussion sections. For their study, the authors have chosen a well-suited sampling location. They approached the topic with solid methods and patience to reveal new insights. I enjoyed reading the manuscript.

There are two issues, I would like the authors to think about and perhaps make according changes to the manuscript. The first issue concerns the reporting of data. Although it is common practice to report mean values and standard deviations, these metrics are not suitable when data is not normally distributed. Often with aerosol data, the value of the standard deviation is similarly large as that of the mean. In normally distributed data, about 68% of all values are within 1 standard deviation about the mean, 16% are larger and another 16% are smaller than that range. Taken seriously, a standard devi-

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ation that is as large as the mean implies that 16% of the data has a negative value, which is impossible for particle concentration values. This problem and a solution to it are described in more detail in Limpert et al. (2008, *Aerobiologia*, 24:121–124, DOI 10.1007/s10453-008-9092-4).

The second issue is that bacteria can attach to all sides of a particle. When looking at a particle, one sees only about half of its surface. Therefore, one also sees only about half of the bacteria attached to its surface, except the particle is transparent. Did you consider this issue? If not, maybe the number of particle-attached bacteria should be re-calculated?

Minor issues

Line 11: ‘aerosols more active’. Do you mean: ‘aerosols to be more active’?

Line 13: Perhaps add that the size category is ‘aerodynamic diameter’.

Line 43: change ‘very scientifically interesting’ to ‘scientifically very interesting’

Line 47: The sentence starting with ‘Whereas. . .’ seem not to be complete.

Lines 54 and 66: Change ‘in the spring of 2013–2016’ to ‘during spring in the years 2013 to 2016’.

Line 86-87: Replace ‘results using BioSamplers’ by ‘the results to those obtained by using BioSamplers’

Line 89, 101: replace ‘the holders’ by ‘the in-line filter holders’

Lines 126-127: ‘indicating that the bacteria did not float individually in the air but were combined with other particles, i.e., the bacteria were particle-attached.’ These particles could also have been other bacteria, i.e. bacteria may have been in clusters while airborne. This may affect the discussion (e.g. Line 213).

Line 146: Replace ‘high difference’ by ‘large difference’

Line 159: ‘moved stagnantly’ seems to be a contradiction, perhaps ‘moved little’ or ‘moved sluggishly’

Figure 2 visualises a lot of information and therefore takes a little while to be understood. That is o.k., but perhaps think of removing the trendlines because they distract from the overall pattern: Concentrations of total bacteria and viable bacteria in the size range below 1.1 μm seem to increase less with increasing dust-like particle concentration, as compared to bacteria associated with particles larger than 1.1 μm . In addition, why do the trendlines have different types of functions?

Line 195: ‘with a residence time shorter than that of the particle-attached bacteria’
Could you provide a rough estimate for the atmospheric residence times of bacteria for dusty and nondusty conditions?

Line 235: A fitting reference in this context is Augustin-Bauditz et al (2016, Atmos. Chem. Phys., 16, 5531–5543, 2016 www.atmos-chem-phys.net/16/5531/2016/)

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