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This paper by Hu et al. reports the abundance and viability of particle-attached and free-floating bacteria in air samples collected at a costal site in Japan in spring during dust and nondust episodes.

The interest for bioaerosols (bacteria, fungi, yeasts, pollens, viruses...) is rather recent but growing every day, particularly because bioaerosols might have impacts on atmospheric processes (precipitation, chemistry, climate) and also on air quality (Human health, agriculture, environment). In this context, the paper presented here is quite important and interesting. Very few studies were conducted in the literature to measure the relative abundance of the bacteria attached or not to particles. In addition, the assessment of the viability of these bacteria is crucial to determine their potential impact. I am supportive of publishing this work in Biogeoscience after the following questions are addressed.

General comments on Figures and Tables

1) Nomenclature of the samples

The various samples are not identified in the same way depending on the figures or tables, sometimes identification is by numbers (1 to 27, see Figure 2, S7, S9), sometimes by dates (Figures 1, S2, S3, S4, S6, S8). As a consequence, it is very often hard to follow the results or comments in the text.

I suggest to adopt always **the same identification** (number is the best). In addition, the type of event (dusty, non-dust) and the metrological information (Prefront, Postfront, Approaching anticyclone and Anticyclone) should also appear in the nomenclature of the samples

For instance, the sample N°**1** collected on the 19th of march 2013 which is **D**usty **and Pr**efont could be named **1 D-Pr,** sample N°7 collected on the 28th of april 2013 which is **N**on-**D**ust and **A**nticyclone could be named **7ND-A…** etc These nomenclatures should be homogenous in all the Tables and Figures.

In parallel I suggest that Table S2 which contains very important results about the abundance and viability of free and attached bacteria should be moved to the main text of the manuscript (and not the Supplement). This table could be completed by the meteorological conditions (Prefront, Postfront, Approaching anticyclone and Anticyclone) and the samples named as suggested 1D-Pr, 7ND-A… etc.

2) Uncomplete presentation of the data

Could the authors explain why only some data on some samples are presented in many figures and not all of them (see Figures 2, S2,S6, S8).

Specific comments

Sample collection and cell enumeration:

p3 and Figure S3: Did you notice the presence of yeasts and fungi (spores) (>>1μm) during your experiment based on epifluorescence microscopy? Why did not you take them into account in your study?

p4 and Figure S4: The authors note some discrepancy between the results obtains by the Andersen sampler used in this work and the two others samplers. The bacteria concentration seems to be usually under-estimation but the main problem in my opinion is that this under-estimated is not "constant", this is the case of the sampling on the 21th of march 2013 (figure S4). How do you take this factor into account in your results?

Concentrations of bacteria of airborne bacteria in segregated size ranges (p 5, Figures 1 and S9)

In my opinion it is quite difficult to really analyze the data presented in Figure 1 and S9 in terms of random or bimodal distributions of the bacteria ... what is the scientific basis of this analysis? Is it based on visual inspection only?

In addition, as noticed by the authors, when non-dust samples are analyzed both types of bacterial distribution are observed. Do you have any explanation about these segregations? Does it mean something linked to the physics of the system? This is not clear! I am wondering if we can really exploit these data. Could the authors comment on that?

Concentration of particle-attached and free-floating bacteria

P7, Table S2, Figure S8: The authors declare "In particular, the percentage ranged from 35% to 73% (49±15% on average) under anticyclone weather conditions, when the air parcels were from marine areas rather than from continental areas and moved stagnantly (Fig. S8). Therefore, there were a substantial amount of free-floating bacteria, and they were frequently the most common bacteria in non-dust air." This is quite interesting however when we look carefully at the data this not so true. For instance, in the event N°7 (anticyclonic, non-dust) compared to N°12 (anticyclonic, non-dust) free-floating bacteria account respectively for 39% and 73% of the total number of cells. However, N°7 (Figure 8) is clearly from marine origin with a slow motion of the air mass while N°12 moved quicker and has a continental origin. It is also true for other samples, so I do not think it is a general assumption. In addition two events (1 and 27) are missing in Figure S8 .
Also did you analyze the biodiversity of the bacteria to justify your sentence "the most common bacteria"?

p7, Figure 2: The authors declare "The concentration of bacteria was usually closely correlated with the mineral dust-like particles in size-segregated samples (Fig. 2)". However, the data presented in Figure 2 are not so obvious when we look at the correlation coefficient r which are generally very low except for 2 cases in Figure 2a and 4 cases in Figure 2c. In addition, there are only 8 samples over a total number of 27. What are the results for the missing 19

samples? Finally, it would be very useful to have SEM images to confirm these conclusions. In my opinion this figure is over-interpreted and the text should be changed.

Viabilities of particle-attached and free-floating bacteria

P9, line 184, Tables 1 and S2: The authors declare: "The viability of particle-attached bacteria varied over a wide range from 18% to 98% (63±21% on average), and the viability of free-floating bacteria was between 56% and 99% (87±12%), higher than the viability of particle-attached bacteria". Did the authors performed statistical analyzes to compare these results?

P9, line 194, *Tables 1 and S2, Figure S8:* The authors declare " In contrast, a large fraction of free-floating bacteria were viable. A fraction of these bacteria were likely from local areas, with a residence time shorter than that of the particle-attached bacteria transported from the Asian continent". Although this assumption makes sense, it is less true when looking at the backward trajectories presented in Figure S8. For instance the event N°20 has a long trajectory from the Asian continent, far from the marine sampling site, while the event N°7 remains mainly over the sea , both samples present the same viability of the free bacteria (85 and 82% respectively), and also for the attached bacteria (72 and 69 % respectively). So in my opinion this reason is not so clear. Please could you modulate your conclusions.

P9, line 203 Tables 1 and S2, Figure S8: The authors declare "An increase in viable free-floating bacteria on the order of 10^5 cell m^{-3} was observed when the weather was fine and the air masses moved slowly from marine areas, favoring the accumulation of bacteria emitted from local areas (Fig. S8)". Again this observation is globally true but some examples contradict it: The event N°7 (marine origin, anticyclone, 0.6 10^5 cell m^{-3}) does not present really higher concentrations of free bacteria compared to sample N°20 (Asian continent origin, anticyclone, , 0.6 10^5 cell m^{-3}). So please could you modulate your conclusions.