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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Variations in airborne bacterial communities at high altitudes over the Noto Peninsula (Japan) in response to Asian dust events" *by* Teruya Maki et al.

Anonymous Referee #1

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In the manuscript entitled "Variations in airborne bacterial communities at high altitudes over the Noto Peninsula (Japan) in response to Asian dust events" by Maki et al., the authors present observation on microbial communities in dust events over Japan, at high medium and low altitudes. A very important topic, and should be in depth explored, yet some modifications and corrections are needed before acceptance for publication.

Specific comments:

- The authors should make it clearer to the readers what is dust and non-dust events. This should be emphasized in the figures (2, 3, 4, 5, 6, 7, 9); figure captions; table (I would recommend adding another column for that information); as well as in the result

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Discussion paper

text. Otherwise the data presented is somehow confusing and not clear.

- It would be helpful to add some information on the DAPI-staining colors in the introduction part. Introducing these definitions only in the discussion (line 465) makes it hard to follow along the text beforehand.

- line 103: It is specified that aerosol origin is from continental areas, however, trajectories and analysis shows marine contribution as well. please rephrase.

- line 120: How were the filter sterilized? please add either company cat. number, or sterilization technique.

- line 160: Please add the immersion oil type.

- line 174: Reference for the DNA extraction method: Authors should double check the ref., as the Maki 2008 paper refers to the Maki 2004... And - as in the 2004 paper the extraction is not from air filters, the authors should specify the extraction efficiency from filters using this method in the current paper.

- section 3.3: The protease treatment is not detailed in the methodology. Although a very important examination, indicative for protein dominance is yellow particle, no documentation of such treatment and detection before and after treatment is presented. The authors should either supply such results and extend methodology, or remove this part.

- I find it very interesting that marine cyanobacteria contribute to the April 2013, March 2015 events etc. as was also observed by Lang-Yona et al., 2014. This could be relevant for the public health at low altitudes. Please add a discussion on the possible health effects of such species and other gram negative bacteria.

- section 4.2: Organic particles might indeed represent dead bacteria and fungi, however also anthropogenic and natural SOA (especially when air transport over polluted areas, as in the current study). This should be emphasized in the discussion, as the statement (fraction of dead cells compared to total microbes) based on Fig. S4 could

be misleading.

- Line 513: I'm not convinced that cyanobacteria are significantly enriched in dust samples. As described in the result section, cyanobacteria were enriched also in non-dust samples. The authors should supply arguments and statistical evidence for this statement.

-section 4.7: Assuming fluxes of specific bacteria as a representative for the origin of the air mass is a rough estimation and should not be made based on such a study with limited number of sampling points. For example, it is well established that the aerosolization of cyanobacteria would be dominant during bloom events. Therefore, if the authors make such statement of cyanobacteria represent marine-originated aerosols, they should supply evidence for presence of cyanobacteria in high altitudes seasonally and annually, and correlate with bloom events. In addition, one significant source of airborne cyanobacteria are the fresh water bodies. Many other factors affect the abundance of airborne microorganisms, and therefore I find it hard to accept such statement, where the presence of microbes will reflect the origin of the air mass accurately. Authors are requested to restrain their assumption.

-line 671: Please supply reference for this statement.

Technical corrections:

- Section 2.7 should be 2.5.

- line 361-363: Please rewrite this sentence.

- line 421: ". . .their abundance fluctuated between from. . ." please check phrasing.

- line 483: .."ranged from 23.3. . ." – consider rephrasing.

- line 505: Mazar et al. reported dust microbial composition over east Mediterranean areas (not European). Please correct.

- Line 513: Please check if "Figure 4" in the text should be corrected.

- Figure 2 – Caption: should be corrected for black particles denoted in grey color.

- Figure 8b: Authors should better defined symbols. It is not clear (from both legend and caption) what are the blue circles (Are they dust samples? non-dust?) The authors should also add information on the statistics significance of the unifrac test. Consider adding dispersion ellipses with 95% standard deviation confidence interval.

- Figure S4: Please specify in caption/legend what the black and white bars indicate.

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