Biogeosciences Discuss., 5, S36–S38, 2008
www.biogeosciences-discuss.net/5/S36/2008/

Biogeosciences Discussions

Interactive comment on "Microbiology and atmospheric processes: an upcoming era of researchon bio-meteorology" *by* C. E. Morris et al.

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Received and published: 11 February 2008

This paper discusses the importance of bioaerosols, particularly of microorganisms, in atmospheric processes. This is a good contribution arguing on the necessity to improve our knowledge about this interdisciplinary question, since microorganisms exhibit special properties that could make them actors of physic and chemistry of the atmosphere. The quantitative participation of bioaerosols to the total particular load of the atmosphere is provided and is very informative. Then, the factors known to influence this content are overviewed as well as the potential sources. The argumentation is globally very convincing but several points could be improved.

-Page194, line28: <Micro-organisms are nature’s product> Why does this suddenly pop-up here? Is this a justification for something?

- The second part (p195) describes the quantitative participation of bioaerosols after giving a very interesting historic of aerobiology. The authors describe the place of bioaerosols amongst atmospheric particles and the factors influencing their nature or number. Even if the concentrations of microbial particles are highly variable in the air, it would be interesting to give ranges of orders of magnitude for the types of sites given in the Table 1. This would help the reader and would depict the huge variations that can exist for this particular fraction of the bioaerosols.

- It is reported (p197, line8) that Gram-positive bacteria are dominant in the air. Though it is not clear whether or not this is related to the reference cited below that focused on the special case of a dust event (Kellogg and Griffin, 2006), I do not agree with this affirmation as it is given as a generality. Indeed, using a molecular approach, Maron et al. (2005, Atmospheric Environment 39, 3687-3695) found that about 65% of the number of bacteria in an air sample were of Gram negative affiliation. There are big variations in the composition of airborne bacteria since this is under influence of sources, themselves varying at least with the period of the year and the site of sampling. <This qualitative and quantitative information about biological aerosols is, nevertheless, subject to variation> as it is mentioned a few lines below. So I believe that such a generalization about a Gram-negative dominance is not possible.

- Then (p197-198) a special emphasis is put in the ice nucleating potential of some species of microorganisms and their ubiquity in atmospheric samples. This really demonstrates the extent to which micro-organisms can be involved in atmospheric processes. Yet, I am rather disappointed that nothing here is presented about their possible action as cloud condensation nuclei (CNN). Indeed, such a capacity was studied in laboratory by Lee et al. (2002, Aerosol Science, 33, 1721-1723) who report a real ability. Also, some recent observations on real samples (Amato et al., 2007, Atmospheric Environment, 41, 8253-8263) suggest that some microorganisms are more efficiently integrated into cloud droplets than others, and this is to my mind relevant here as it might reveal and be a consequence of their higher CCN activity.

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- About the third section (p195-200), I would suggest to discuss quantitative and qualitative points and factors of variation, then to expose the IN efficiencies in order to zoom in from a general to a very precise topic.

- page198, lines1&2: add <C> after the degree symbols.

- The fourth part (p203) first presents the potential implication of microbes in atmospheric chemistry. About <the role of airborne bacteria as potential sources and sinks> (p204, line 12) of organic chemical compounds, I am surprised to see that recent papers have not even been referenced (Amato et al., 2007, Atmospheric Chemistry and Physics 7, 4159-4169; Hill et al., 2007, Journal of Geophysical research 112, doi:10298/2006JD008002). These constitute yet good arguments confirming about the idea that microbes participate to carbon at nitrogen atmospheric chemistry.

As a concluding general remark, I thought the argumentation sometimes difficult to follow at the first reading, partly due to a lack of cohesion between the different sections. I guess that adding some subtitles within each section could help to address this point.

Interactive comment on Biogeosciences Discuss., 5, 191, 2008.