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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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General Comment:

The paper is a helpful in setting the stage for the collection of papers included in the Biogeosciences Special Issue “Properties of biological aerosols and their impact on atmospheric processes”. The authors draw on their extensive experience in the subject and make a strong case for the benefits of collaboration between disparate fields in biological and physical sciences.

Specific Comments:

I see this paper as a panorama. It looks back in time, looks around, and then looks into the future. Like all panoramic views, it bears the mark of where the authors stand, but

being a work of several authors in fact many views are presented.

The main question to me is how much of a transition point is really ahead in the current pursuit of understanding the coupled system of airborne biome, air chemistry, aerosols and clouds. One of the strengths of this paper is that makes the case for the links in that system. Perhaps that realization is the main element of a transition to a new paradigm and the authors set good examples in the practice. As more and more researchers in diverse fields discover links within that system and as they mutually help each other to see the fuller meaning of their findings, that does begin to constitute a new era. Is that enough? Is it backed up by powerful new techniques? Will there be funding support in the face of competing interests and social needs? Will a cohesive discipline emerge, or will it be diffuse?

Focusing on my filed of cloud physics, the exploration of the role of biological entities in droplet and ice nucleation has three dimensions. First, learning more about the identity, sources and transport of one segment of these nuclei is a great help in solving the broader problem of cloud and precipitation development. Second, biological sciences bring new technical capabilities to these difficult investigations. Third, since clouds are such important transporters and transformers of trace atmospheric constituents, and that is also the case for the biological component, it is clear that any analysis of the abundance and distribution of microorganisms in the atmosphere must consider the role of clouds. Thus, there is evident mutual interest from the biological and atmospheric sciences.

Technical corrections:

page 194, line 17: Physical chemistry is surely a large factor, but source and sink strengths (atmospheric lifetimes) control the concentration.

page 195, line 23: An important reference to add: “Aerobiology – The Ecological System Approach” US/IBP Synthesis Series 10; R.L. Edmonds (editor). Academic Press/Dowden, Hutchinson and Ross, Inc., Stroudsburg, Pennsylvania.

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(ISBN 0-87933-364-4). 1979.

page 196, lines 11-13: The proportion of aerosol of biological origin is not the same at all sizes. For what size range is the 25% number cited here valid? This size dependence should be part of the many other points in the paper that emphasize the importance of biological particles.

page 196, lines 19-21: The importance of re-suspension of snow is not clear from what is being said here. Also, whether ice particles contain condensation nuclei, or not, is an issue in all clouds and depends on the mode of ice nucleation, i.e. deposition versus immersion freezing. These issues are not treated in sufficient detail to be meaningful and are probably best left out of this paper.

page 196, line 24: It would be better to compare the number of biological particles to the total number, or to a rough estimate of the number of IN that would have been involved in producing unit volume of snow.

page 197, lines 6-7: For a better perspective, the importance of micro-organisms should be weighed by comparisons to total numbers (size dependent) and with a consideration of organic material in general.

page 197, line 25: Might be a good place for a cross-reference to Möhler et al. (2007) in the same special issue.

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