

Interactive comment on “Microbiology and atmospheric processes: an upcoming era of research on bio-meteorology” by C. E. Morris et al.

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The challenge now is to <<go beyond descriptions of abundance of micro-organisms toward an understanding of their dynamics in terms of both biological and physico-chemical properties and of the relevant transport processes>>.

As noted already by the other referees this panoramic paper is both a review and a call for new and mostly interdisciplinary research to underpin a new era of investigation of the roles microorganisms might play in meteorological phenomena.

The authors note that there is much to do.

For example, in order to derive values for particle parameters in models to estimate trajectories the authors note we need to know more of: mechanisms underlying source

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strength; size and nature of the microbe-transporting particles; factors controlling their metabolic activity; survival in transit; and scales of transport.

To characterise relevant properties of biological particles to understand their involvement in atmospheric chemistry, cloud formation and precipitation, and radiative forcing we need: the occurrence of microbial particles with condensation or ice nuclei capacities; occurrence of the same as binding sites or metabolic sinks/sources for various atmospheric chemicals; and the extent to which they are involved in processes that could mitigate the undesirable foreseen changes of climate change, and which can be enhanced.

And methodology needs to be developed, such as: the detection over space and relatively short time intervals; in situ bioaerosol analyzers with a wide dynamic range; coordinated sampling campaigns at multiple field sites; advances in numerical models to capture processes such as aerosol-cloud interactions; and modelling that incorporates biological particles, their sources and their possible environmental implications, and which is complementary to field and laboratory multi-disciplinary studies.

Indeed, the paper raises so many priorities for research that I would have liked a summary table at the end to gain an overview. However, this may be a personal style preference.

Suggested changes to the text p 197 l. 7. Change to Among the bacteria detected in the atmosphere using classical techniques, the majority is Gram-positive. And add a sentence to the effect that when direct DNA-based methods are used either Gram-positive (especially High G+C and Low G+C Gram-positives) or Gram-negative (especially gamma and beta Proteobacteria) can predominate.

p. 198, l. 21. fungal spores (4 spp) and bacteria (2 spp) were recovered from between 48 and 77 km altitude (Imshenetsky, A.A., Lysemko, S.V. and Kazkov, G. A.: Upper boundary of the biosphere, Appl. and Environ. Microbiology 35:1-5, 1978).

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