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- [Volumes and Issues](#)
- Special Issues
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- Title and Author Search

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Comment on a Paper

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Atmos. Chem. Phys., 9, 9263-9280, 2009

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## Bacteria in the global atmosphere – Part 1: Review and synthesis of literature data for different ecosystems

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**Abstract.** Bacteria are ubiquitous in the atmosphere, with concentrations of bacterial cells typically exceeding  $1 \times 10^4 \text{ m}^{-3}$  over land. Numerous studies have suggested that the presence of bacteria in the atmosphere may impact cloud development, atmospheric chemistry, and microbial biogeography. A sound knowledge of bacterial concentrations and distributions in the atmosphere is needed to evaluate these claims. This review focusses on published measurements of total and culturable bacteria concentrations in the atmospheric aerosol. We discuss emission mechanisms and the impacts of meteorological conditions and measurement techniques on measured bacteria concentrations. Based on the literature reviewed, we suggest representative values and ranges for the mean concentration in the near-surface air of nine natural ecosystems and three human-influenced land types. We discuss the gaps in current knowledge of bacterial concentrations in air, including the lack of reliable, long-term measurements of the total microbial concentrations in many regions and the scarcity of emission flux measurements.

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Citation: Burrows, S. M., Elbert, W., Lawrence, M. G., and Pöschl, U.: Bacteria in the global atmosphere – Part 1: Review and synthesis of literature data for different ecosystems, Atmos. Chem. Phys., 9, 9263-9280, 2009. [Bibtex](#) [EndNote](#) [Reference Manager](#)



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