

## **Deposition can be biological, too**

M. E. Dueker<sup>1</sup>, G. D. O'Mullan<sup>1,2</sup>, K. C. Weathers<sup>3</sup>

Globally, bacteria suspended in the atmosphere, or microbial aerosols, can range in concentration from  $1 \times 10^4$  to  $6 \times 10^5$  cells  $m^{-3}$ . They can be either attached to ambient aerosol particles or exist singly in the air. They affect climate through serving as ice, cloud and fog nucleators, and have the metabolic potential to alter atmospheric chemistry. Despite the ubiquity of these microbes and their global importance, little is known about their source, viability, and in-air metabolic activity. Even less is known about the ecological ramifications of the deposition of these microbes along with the nutrients and pollutants present in the atmosphere. Microbial aerosols are known to be diverse in identity and biogeochemical capacity, and can be transported between seemingly isolated biomes (e.g. ocean to land, desert to ocean). Because they are attached to ambient aerosol particles (or are the particle themselves), deposition of these microbes should be controlled by the same mechanisms found to control deposition of ecologically-relevant nutrients and pollutants. On the coast of Maine, we found that the deposition of viable microbial aerosols increased by three orders of magnitude when fog was present. Molecular identification of these microbes revealed a diverse community of predominantly marine organisms, confirming the atmospheric transfer of viable bacteria from the ocean surface to the coastal environment. Implications for this transfer include bi-directional atmospheric feedbacks between terrestrial and coastal ocean systems and the potential for water quality to affect air quality at coastal sites.

Correspondence to: M. E. Dueker ([med2109@columbia.edu](mailto:med2109@columbia.edu))

[1] Lamont Doherty Earth Observatory, Columbia University, 61 Route 9W, Palisades, NY 10964

[2] Earth and Environmental Sciences Department, City University of New York Queens College, 65-30 Kissena Blvd., Flushing, NY 11367

[3] Cary Institute of Ecosystem Studies, Box AB, Millbrook, NY 12545-0129