

Interactive comment on “A possible role of ground-based microorganisms on cloud formation in the atmosphere” by S. Ekström et al.

Anonymous Referee #1

Received and published: 19 December 2009

General comments:

In this paper the authors show for the first time that specific organic molecules (biological surfactants produced by microorganisms) can have better cloud-forming efficiencies than inorganic salts. They thus might affect cloud formation without leaving the Earth's surface. These are very interesting findings, as so far the experimental research has been focused on ice nucleating abilities of biological aerosol particles and microorganisms. With this work, the authors show that bioaerosols can also contribute to the production of very effective cloud condensation nuclei. This opens many interesting questions for further interdisciplinary research.

Specific comments:

C3647

Page 10037, line 9-12: The authors state that microorganisms are generally too heavy to stay in the atmosphere. This is not entirely correct and might need clarification, as bacteria and viruses do stay and are transported in the atmosphere, as are other primary biological particles like pollen and fungal spores. The significance of their contribution to CCN however, is as of yet unclear. For clarification of this issue I therefore suggest citing one of the following papers:

Sun, J. & P. Ariya (2006) Atmospheric organic and bio-aerosols as cloud condensation nuclei (CCN): A review, *Atmospheric Environment*, 40, 795–820

Moehler, O. et al. (2007) Microbiology and atmospheric processes: the role of biological particles in cloud physics, *Biogeosciences*, 4, 1059-1071

Deguillaume, L. et al. (2008) Microbiology and atmospheric processes: chemical interactions of primary biological aerosols, *Biogeosciences*, 5, 1073-1084

Amato, P. et al. (2005) Microbial population in cloud water at the Puy de Dôme: Implications for the chemistry of clouds, *Atmospheric Environment*, 39, 4143-4153

Page 10037, line 16: Additionally to Charlson et al. (1987) the authors might also like to cite Charlson et al. (2001) as it also deals with the surface tension lowering by organics in cloud water.

Charlson, R. J. et al. (2001) Reshaping the Theory of Cloud Formation, *Science, New Series*, Vol. 292, No. 5524 (Jun. 15, 2001), pp. 2025-2026

Page 10042, line 4: In the phrase “rhamnolipids . . . were from two different bacterial extracts” it is not clear if the rhamnolipids in question stem from two different bacteria strains or if they were sampled under two different conditions.

Page 10047, line 11: In this context, the mention of microgels as discussed by Leck & Bigg (2005) might be of interest.

Leck, C. and E. K. Bigg (2005) Source and evolution of the marine aerosol – A new

C3648

perspective, GRL, Vol. 32, L19803

Interactive comment on Biogeosciences Discuss., 6, 10035, 2009.

C3649