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Fungal spores as potential ice nuclei in fog/cloud water and snow

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INTRODUCTION: In discussions about climate change and precipitation frequency biological ice nucleation has become an issue. While bacterial ice nucleation (IN) is already well characterized and even utilized in industrial processes such as the production of artificial snow or to improve freezing processes in food industry, less is known about the IN potential of fungal spores which are also ubiquitous in the atmosphere. A recent study performed at a mountain top in the Rocky Mountains suggests that fungal spores and/or pollen might play a role in increased IN abundance during periods of cloud cover (Bowers et al. 2009). In the present work concentrations of fungal spores in fog/cloud water and snow were determined.

EXPERIMENTAL: Fog samples were taken with an active fog sampler in 2008 in a traffic dominated area and in a national park in São Paulo, Brazil. The number concentrations of fungal spores were determined by microscopic by direct enumeration by epifluorescence microscopy after staining with SYBR Gold nucleic acid gel stain (Bauer et al. 2008).

RESULTS: In the fog water collected in the polluted area at a junction of two highly frequented highways around 22,000 fungal spores mL-1 were counted. Fog in the national park contained 35,000 spores mL-1. These results were compared with cloud water and snow samples from Mt. Rax, situated at the eastern rim of the Austrian Alps. Clouds contained on average 5,900 fungal spores mL-1 cloud water (1,300 – 11,000) or 2,200 spores m-3 (304 – 5,000). In freshly fallen snow spore concentrations were lower than in cloud water, around 1,000 fungal spores mL-1 were counted (Bauer et al. 2002). In both sets of samples representatives of the ice nucleating genus Fusarium could be observed.

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