



The Ice Nucleation Activity Of Pollens And Fungal Spores

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The heterogenous IN of biogenic particles is of growing interest due to its impact on ice cloud formation and so global climate. While sufficient data about the IN of certain bacteria, like *Pseudomonas syringae*, have been published, only a few studies have had the IN of pollens and fungal spores in their focus. The main aims of this project are on the one hand to generate an overview of the nucleation behaviour of a broad sample spectrum, and on the other the investigation of the IN-active agents on the pollen surface, which – in contrast to the bacterial IN proteins – are unknown up to now.

Nucleation spectra, which correlate the freezing temperature with the amount of frozen droplets, have been measured mainly by cryo-microscopy of oil emulsions loaded with pollen or spores. Additionally we have performed droplet freezing measurements in a smog chamber. The experiments show strong differences between the pollen species, with median freezing temperatures from -14°C to -33°C.

Our investigation of the pollen surface up to now has shown, that the IN ability of pollen is most likely not derived from integral properties: There is no correlation between the nucleation temperature and the microtexture of pollen, which has been measured with scanning electron microscopy. The pollen images show no key difference between strongly and weakly IN active species. Analysis of the pollen surface by ATR- and Raman-spectroscopy has shown only minor differences in the chemical composition between the species. So the quantity of certain functional groups, e.g. carbonyls, seems to be of less or no importance for the IN activity, either.

It is quite possible, that the IN activity of pollen can be derived from special surface nutrients, like the IN proteins of bacteria and fungi. In our further investigations we will stress pollen in different ways (e.g. heat, chemicals, enzymes) to degenerate the nutrients and determine the impact on the nucleation behaviour.