Geophysical Research Abstracts
Vol. 20, EGU2018-16482, 2018
EGU General Assembly 2018

Time and spot dependency of ice nuclei from water sources in the mountains of Tyrol, Austria

Philipp Baloh (1), Regina Hanlon (2), Renée Pietsch (2), Eoin Dolan (1), Julia Burkart (1), Laura Felgitsch (1), Christopher Anderson (2), David G. Schmale III (2), and Hinrich Grothe (1)

(1) Institute of Materials Chemistry, TU Wien, Vienna, Austria (teresa.seifried@tuwien.ac.at), (2) Department of Plant Pathology, Physiology, and Weed Science, Virginia Tech, Blacksburg, Virginia, USA

Natural ecosystems are a complex source of nuclei for heterogeneous ice nucleation—the process by which particles can nucleate ice between 0 and -35°C. The analysis of these particles can pose some difficulties due to the variety of possible particles that may alter ice nucleation and their interaction. These ice nucleating particles (INPs) can be of biotic or abiotic origin. They foremost have an immediate impact on the ecosystem they spring from yet some may also be transported (e.g. by becoming airborne or through the water system) to places where they impact nucleation events far away from their sources. To draw connections to other field observations of INPs (e.g. in clouds) it is helpful to thoroughly characterize the INPs near their sources. For this project, we collected water samples from streams and ponds in an alpine area in the mountains of Tyrol, Austria over four times of a year. All samples were filtered through a 0.22μm filter. Both, the unfiltered samples and the filtered samples, were tested for ice nucleation activity with the VODCA (Vienna Optical Droplet Crystallization Analyser) system. Additionally, microorganisms were cultured on different types of media. Resulting colonies were tested for their ice nucleation ability using a droplet freezing assay and identified to the level of the species. Preliminary analyses suggested that the percentage of ice-nucleating microbes varied with season; greater percentages of ice nucleating microbes were present during colder months. Since glacial melt varies strongly over the year with the fraction of mineral dust suspended in it—which serves as an inorganic ice nucleation agent—XRD analyses of the sediments were carried out to further differentiate between inorganic and biological ice nuclei. We present a time and spot dependency of ice nucleation activity and biological ice nuclei in the sampled region with further spectroscopic (Raman, IR) information on selected samples.