

Drone-based measurements of biological ice nucleation particles in the atmosphere

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The atmosphere comprises a variety of biological aerosol particles some of which are known as biological ice nucleation particles (BINPs), including pollen, fungal spores, or bacteria. These particles allow to freeze supercooled water droplets at higher subzero temperatures when present in clouds, and therefore may influence weather phenomena and climate. Even though many studies pointed out a high ice nucleation activity (INA) of biological material in *vitro* [1], less is known about the release of BINPs from the biosphere and the distribution of BINPs in the atmosphere.

For this research, two drone-based systems were developed to investigate bio-aerosols at different altitudes above possible BINP sources. *Via* an Impinger, BINPs were sampled in water and the INA was measured using the Vienna Optical Droplet Crystallization Analyzer (VODCA). Further, an impactor captured aerosol particles of different size categories and allowed to study their morphology and chemical structure with microscopic and spectroscopic techniques (fluorescence microscopy, SEM, AFM, Raman).

[1] Pummer, B. G., et al. "Ice nucleation by water-soluble macromolecules." *Atmospheric Chemistry and Physics* 15.8 (2015): 4077-4091.