P3-11 Investigating sub-particles of pollen with a single particle mass spectrometer

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Pollen have gained increasing attention over the last decades due to their ability to impact cloud microphysics by acting as cloud condensation nuclei and ice nuclei. Recently, laboratory studies have shown that the cloud forming potential of pollen grains is governed by macromolecules that can be washed off from pollen grains when left in water for several hours (e.g. Pummer et al. 2015). As well, it is known that pollen can rupture under specific conditions (e.g. Taylor et al. 2004) and release material from their inside i.e. cytoplasmic material, commonly referred to as sub-particles. These sub-particles are likely to act as cloud condensation nuclei (Steiner et al. 2015). However, information on the presence and distribution of such particles in the atmosphere is scarce and a method to identify sub-particles is lacking.

In this study we develop a method to induce pollen rupture by mechanical stress. We apply this method to five different pollen species (*Betula pendula, Phleum pratense, Poa pratensis, Corylus avellana, Artemisia vulgaris*) and extract soluble and solid cell material. We find that four of the five investigated pollen species contain particulate material in the size range from a few hundred nanometer to a few micrometer. We investigate these particles with the laser ablation single particle mass spectrometer (LAAPToF) of the University of Vienna. The sub-particles are aerosolized with a nebulizer, dried and introduced into the LAAPToF. The LAAPToF uses a 193 nm Excimer laser to ionize single particles and a bipolar time-of-flight mass spectrometer to obtain positive and negative mass spectra of the ions produced by each particle. Aerodynamic particle sizing is achieved with two 405 nm scattering lasers. For each pollen species we obtain mass spectra of the sub-particles and highlight characteristic features that might help to identify such particles in the atmosphere.

References

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Taylor et al. 2004. Clin. Exp. Allergy, 34, 1591–1596.

Steiner et al. 2015. Geophys. Res. Lett., 42, 3596–3602.