A new sampling method for airborne microplastics

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Abstract

The transport mechanisms of microplastics in the atmosphere are fundamental for our understanding of the global plastic cycle. Despite the growing interest and the increasing number of studies on the subject over the last five years, there is hardly any comparable data. One of the reasons for this is a variety of sampling methods, which differ particularly in terms of sampling device, measurement duration and height, cut-off size and the method chosen to verify microplastic identification.
To address these challenges we developed a cost-efficient and standardized protocol for active-sampling airborne microplastics. The protocol was set up within the framework of the three-year project "MPF - Microplastic in Forests" for understanding the import and export of microplastics in forest ecosystems and is part of a holistic sampling concept that considers all compartments of the forest.
The protocol comprises of the simultaneous sampling of a standardized amount of air at a set airflow in three different heights to differentiate circulation patterns. The used sampling device collects the particles in a stainless-steel petri dish, allowing a complete investigation of the particles sampled. Preliminary results show that when sampling in forests not only the sampling height, but the distance from the forest margin play a role in the presence and distribution of microplastics due to the comb-out effect of forest canopies. Therefore, sampling should be done along transects and the sampling height must be adapted to the crown structure.

Keywords: airborne microplastics, active air sampling, forest canopy, μRaman, nile red

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