Characterization of Microplastics in Alpine Environments: Using automated FTIR methodologies and Aging Microplastics Experiments

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Abstract

Recent studies have strongly suggested that microplastics (MPs) are present in every ecosystem on Earth. Discovery of their air transport patterns, origins, and rates of deposition into terrestrial environments have been a research focus in the past five years. The scientific community has yet to develop standardized approaches for studying the source and accumulation of MPs in terrestrial environments, where there are estimated to be 4-23 times more MPs than in oceans. It is evident that plastic particles can affect the immune, gastrointestinal, and respiratory systems of living organisms. Because of their inability to degrade and constant weathering to smaller particles they can affect ecosystems for several generations and accumulate in higher trophic levels. With the simultaneous progression of increased glacial melt due to climate change and increasing use of plastics, the accumulation and release of air transported MPs from snow fields to aquatic and terrestrial environments will increase. The relative contribution of long-range versus short-range transport of MPs is not clear, and therefore sites were specifically chosen based on general wind direction, proximity to potential point source, and microclimate topography. Novel Fourier Transform Infrared spectroscopy methodologies were used to create an automated counting and polymer identification of microplastics in the snow samples. Accumulation and deposition rates of aeolian transported microplastics in snow will be shared. Furthermore, assessment of affects of weathering and aging on microplastics in the environment will be shared based on laboratory experiments.

Keywords: Snow, Aged Microplastics, Environmental Sampling, FTIR, Automated Techniques

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