Transport mechanisms of pristine and bio-fouled microplastic particles on rough surfaces

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Abstract

The distribution of microplastic and its impact on different environments have recently become a widely recognized research field. Still, research focuses mainly on marine and freshwater ecosystems and leave terrestrial environments understudied. Therefore, our knowledge on transport mechanisms of microplastics in soils and sediments is very limited. This holds especially true for their surface transport. Consequently, we investigate transport mechanisms of microplastic during runoff on rough surfaces. Under laboratory conditions, we tracked fluorescent, irregularly shaped polystyrene (PS) and polymethyl methacrylate (PMMA) particles using a CMOS camera. Within our setup, we focused on different parameters, such as the irrigation and runoff rates, inclination, surface roughness and film thickness to decipher the surface transport of microplastics in terrestrial environments. Furthermore, we compared the transport of pristine and bio-fouled particles to consider the importance of biofilms. Our results indicate that surface roughness has the largest effect on the particles' movement, while bio-fouling might increase the velocity and transport distance.

Keywords: surface transport, bio, fouled particles, CMOS camera, surface roughness

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