
Textile sources as the main contributor to atmospheric microplastics in Bahia Blanca, Buenos Aires, Argentina

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Abstract

The environmental fate of MPs has been extensively demonstrated in all environmental spheres. However, attention to the atmosphere is still considered incipient. The aim of the present work was to assess the presence of airborne microplastics deposited within the rainfall in Bahia Blanca City at the SW Buenos Aires, Argentina. Sample collection was conducted on March, August, September, October, November and December 2021 using an active rain collector consisting of a glass funnel and a PVC pipe which opens uniquely during rain events. Results obtained showed that all rain samples contained MPs. Considering all samples, an average concentration of 194.18 MPs m⁻²d⁻¹ was found. The highest abundance was observed in November (354 MPs m⁻²d⁻¹) while the lowest in March (59 MPs m⁻²d⁻¹). Considering the size, range was from 0.1 mm to 3.82 mm being the most abundant articles less than 1 mm (86%). The dominant form of microplastics found were fibers (97.3%), followed by fragments (1.6%). Color blue predominated in the total samples (31.5%), followed by light blue (26%) and yellow (16%). On the other hand, the existence of small particles (< 2mm) composed by mineral material and plastic fibers were recognized. The chemical composition of suspicious microplastics was examined by Raman microscopy. The analysis of μ -Raman spectra confirmed the presence of polystyrene, polyethylene, terephthalate, polyethylene vinyl acetate fibers and provided evidence of fibers containing industrial additives as indigo dye. While a dominance of small plastic microfibers was found, considering chemical composition, shape and colors, textile was pointed as a probable major source for the area. The main sources of fibers comes from the degradation of synthetic textiles present in clothing that may be shed and released as clothing wears out or during domestic laundry washing.

Keywords: microplastics, rainwater, plastic fibers, μ , Raman, South America

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