
Microplastics in sewer sediments of the Parisian combined sewer network

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Abstract

A sewer management system consists of sewer network and wastewater treatment plants (WWTPs). Since microplastics (MPs) were detected in wastewater, their occurrence and fate in WWTPs has been investigated in the last decades, while it was not the case of sewer networks. Sedimentation occurs inside sewer networks when contaminants detach from wastewater and settle down instead of being transported to WWTPs. This happens due to moderate flow rate of sewage during nights and dry periods, leading to the formation of wet deposits, named sewer sediments. Once the flow rate increases rapidly during wet weather, sewer sediments might be resuspended, releasing contaminants into wastewater. In case of heavy rain events, when combined sewer overflows happen, wastewater is discharged into the environment without treatment. MPs, found abundant in wastewater, may act similarly to other contaminants – trapped in sewer sediments and released later during intense events. To examine this hypothesis, samples were collected from sand chambers inside Parisian combined sewer networks to have a first idea about MP content inside sewer sediments. This study will increase the knowledge on the occurrence and fate of MPs in the whole sewer system. The collected sewer sediments were highly heterogeneous from organic-rich to grainy components. They were freeze-dried to remove water content and sieved through 5mm mesh to discard large items. A subsample of 0.5g then underwent chemical oxidation with H₂O₂ and density separation with NaI to isolate MPs from the environmental matrix. The full subsample was scanned with the automated μ -FTIR mapping (Nicolet iN10 MX, Thermo Scientific). Data processing was done with the siMPle software to identify the polymers composing the particles. MPs were detected in all samples, ranging from 5×10^3 to 178×10^3 particle/kg dry weight with polypropylene as the most abundant polymer. Besides, the correlation of MPs with TOC content will be explored.

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