
Development of cost-effective methods for sediment extraction – a comparison of two known methods

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Abstract

Microplastic (MP) pollution is a recognized worldwide concern, and new approaches are crucial to meet the increasing demands for standardized, fast, and reliable measurements. Previously published studies showed high concentrations of MP in an urban fjord, Byfjorden, Bergen, Norway sampled in 2015. In the present work, the same sample area is investigated: two discharge sites for wastewater and three deposition sites in deep regions of the fjord. Two methods of extraction by density separation are compared with marine sediments. Method 1 used the Microplastic Sediment Separator (MPSS) with 30 L of ZnCl₂, and Method 2 used a set-up of four beakers with 700 mL ZnCl₂ and $\frac{1}{4}$ of the sediment sample per beaker (FP4 Portable Flocculation Tester, Jar-test). The samples were then treated by identical protocols of enzymatic and oxidizing purification at NORCE Plastlab, Stavanger before analysis with Py-GC/MS. The comparison of results will be presented and indicate small differences between the two methods. The cost-efficient Jar method may be suitable for monitoring highly contaminated sediments such as urban harbors in order to follow trends of MP contamination through monitoring programs. The comparison of extraction methods will be discussed, and possible future developments outlined. If mandatory monitoring for chemical and ecological status (following the Water Framework Directive, WFD) would include MP quantification, this opens the possibility to observe changes in MP pollution over time. At this stage, MPs are not included for monitoring in the WFD. Analysis of sediment samples from 2016 and 2019, before and after the installation of secondary WWTP respectively, will create a timeline that may show the potential effect of WWT after a few years. However, to know whether the requirements of SDG14.1 to reduce marine debris are met, monitoring is a necessity, either at the outlets or at the recipient.

Keywords: MPSS, Jar, monitoring, timeline, sediment, extraction

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