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# Redistribution of microplastics within sediment after remobilization: Experimental study

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## Abstract

Microplastics (MPs) have been observed almost everywhere researchers looked for them. While the number of observations has exponentially increased since the last decade, the sources, transfers, and fates of MPs are still imperfectly known. This is peculiarly valid at the water-sediment interface, where the mechanisms behind flow and transport processes of particles are complex. There, the vertical and horizontal distributions are influenced by both water flow and particle interactions. Recent studies indicate that basic laws from sediment movement imperfectly estimate MPs behavior, highlighting the importance of proper experimental study with MP particles. In this study, the vertical redistribution of virgin high and low density MPs, with different sizes and shapes, was investigated within 11 sediment size classes. MPs were spiked into sediments in a 1 m height column fill to the top with water. The column was turned upside-down several times to simulate a physical perturbation of the sediment and to study the following deposition pattern. As expected, low-density polymers were mainly recovered in the water column while high-density polymers were found within all sections of the sediments, shifting according to the sediment size classes. Unexpectedly, a significant part of low density was also retrieved at the surface of the sediment and the MP distributions change, not only with size, but also with particle shape. The observed distributions were compared to the expected distributions based on vertical velocity formulas. Both distributions match fairly well, but MPs were observed slightly above their predicted levels. Thereby, vertical velocity formulas could be used at a first approximation, but still have to be enhanced. In conclusion, this study highlights the importance of considering MPs as a multi-dimension particles, and provide some clues to understanding their sources, transports, and fates.

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