
Macrofauna bioturbation promotes seabed burial of microplastics: a laboratory study

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Abstract

The role of microplastic (MP) particles in marine ecosystem dynamics is still largely unknown, despite their increasing occurrence in ocean waters worldwide. As the majority of MPs eventually sinks to marine sediments, it is of crucial importance to understand their interaction with the organisms inhabiting such habitats. Particularly, macrobenthos is recognized as one of the key players in regulating sedimentary processes and functioning through its burrowing, feeding, and bioirrigating activities. We performed a mesocosm experiment with natural sediments from the Belgian part of the North sea hosting high densities of bioturbating taxa including polychaetes, bivalves and ophiuroids. We investigated to which extent the local macrofauna community is responsible for the burial of low density MPs – specifically 200 μm polyethylene (PE) fragments - within marine sediments. Our results show that, on average, 40 % of surface MPs were buried down to 6 cm when macrobenthic organisms were present, most of the plastic being displaced within the first week of incubation. In contrast, 90 % of MPs accumulated in the first 2 cm in absence of fauna. The presence of MPs did not affect the survival of the organisms during the total four weeks of incubation, however potential behavioral changes were not investigated. We conclude that the presence of macrobenthos strongly enhances the displacement of surface MPs through the sediment matrix. This fortifies the conception of the seabed not only as a sink for descending pelagic MPs but also as long-term catch for inorganic particles sequestered to deeper depths.

Keywords: bioturbation, microplastics, benthos, burial, marine sediments

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