

國立臺灣海洋大學 海洋環境與生態研究所
海洋生物地球化學與生態系統整合研究

題 : Scavenging of polystyrene microplastics by sediment particles in both turbulent and calm aquatic environments

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Abstract

Microplastic particles (MP) are emerging pollutants ubiquitously distributed in all aquatic environments, remaining in suspension in the water column or deposited in sediment beds. MP are suspended in the water column along with other particles with whom they might interact. The current study presents the results of slow-settling MP (Polystyrene) scavenged by fast settling sediment particles. The study covers a wide range of salinities (from freshwater to saltwater) and shear rates (from calm to mixing ecosystems). In calm regions, the scavenging by fast-settling sediment particles produces the greatest removal of MP from the water column (42 % of MP in suspension), thus increasing the MP pollution of sediment beds. In contrast, turbulence reduces the settling of MP and sediment particles (72 % of MP remain in suspension), causing more pollution than in calm regions. Although salinity increased the buoyancy of MP, the scavenging by sediment has been found to overcome the increase in buoyancy. Consequently, MP are transported to the sediment bed independently on the salinity. Therefore hotspots of MP contamination in aquatic environments need to consider both the MP and sediment interaction and the local mixing of the water column.

Reference:

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抽象的

微塑料顆粒 (MP) 是一種新興污染物，普遍分佈在所有水生環境中，懸浮在水柱中或沉積在沉積物床中。MP 與可能與之相互作用的其他粒子一起懸浮在水柱中。目前的研究展示了緩慢沉降的 MP (聚苯乙烯) 清除被快速沉降的沉積物顆粒所吸引的結果。該研究涵蓋了廣泛的鹽度 (從淡水到鹹水) 和剪切率 (從平靜到混合生態系統)。在風平浪靜的地區，快速沉降沉積物的清除作用最大程度地去除了水柱中的 MP (懸浮液中 42% 的 MP 顆粒)，從而增加了沉積床的 MP 污染。相比之下，湍流減少了 MP 和沈積物顆粒的沉降 (72% 的 MP 保持懸浮狀態)，造成比平靜區域更多的污染。雖然鹽度增加了 MP 的浮力，但已發現沉積物的清除克服了浮力的增加。因此，MPs 獨立於鹽度被輸送到沉積床。因此，水生環境中 MP 污染的熱點需要同時考慮 MP 和沈積物的相互作用以及水柱的局部混合。