
Microplastic distribution, abundance and composition in the water column, sediments and biota samples collected along the Tyrrhenian Coasts (Mediterranean Sea)

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Abstract

A sampling campaign promoted by Greenpeace Italia, was performed along the Tyrrhenian Coasts (Mediterranean Sea), collecting surface water, sediments and biota samples from sites characterized by different level of anthropogenic pressure (ports, river mouths, MPAs), in order to assess the composition and spatial distribution of MPs. Traditional devices (i.e. Manta net) were adopted to collect sea surface water and sediments samples (i.e. Van veen grab) at depth ranging between 10 and 20 meters. In addition, a Sequential Filtering Device_SFD (300-100-20 μm mesh size) was used to filter water at different depths (from 5 to 10 meters). Organisms were collected in collaboration with local fishermen, selecting species from different habitats and trophic habits. MPs characterization has been supported by ATR-FTIR analyses. Results highlighted significant differences in MPs concentration along the water column, varying from 0.05 to 4.15 items/m³ in surface water, from 4 to 253 items/m³ in the 5-10 m layer, and from 7.75 to 53.59 items/Kg in sediment. The majority of particles were in the range 1-3 mm in all samples with an increase proportional to depth; microfibers were the most abundant shape in water column and sediment (98%-55%), compared to surface water (10%). Considering chemical composition, PE and PP were the most abundance polymer types for surface water and sea water column while PVC for sediments. As regards ingestion, an average of 2 MPs/specimen was reported for 40% of analyzed organisms. Most MPs extracted from tissues were in the size range of 500-100 μm and microfibers were confirmed also in the biotic compartment as the most frequently typology accounting for 88% of total MPs. This study confirms the vulnerability of the Mediterranean Sea to plastic pollution and suggests the need to perform surveys including different marine compartments to achieve a reliable monitoring strategy for MPs in marine environment.

Keywords: Mediterranean Sea, Marine pollution, Water column, Biota, Sediment, Microplastics

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