

## **BREAKING THE PARADIGM: MARINE SEDIMENTS HOLD TWO-FOLD MICROPLASTICS THAN SEA SURFACE WATERS AND ARE DOMINATED BY FIBERS**

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Marine compartments are often considered independent environments in studies on plastic pollution (Ali et al., 2021). Consequently, little is known about microplastic (MPs) distribution amongst those habitats closely linked. Here, we perform an interactive assessment of MPs abundance and composition from the pelagic habitat to beaches integrating shallow seafloor sediments of a coastal Mediterranean marine protected area and evaluating MPs ingestion in holothurians, echinoderms, molluscs, and fishes inhabiting the area. We observed a gradient in the accumulation of MPs from the sea surface ( $0.17 \pm 0.39$  MPs/m<sup>2</sup>) to the seafloor ( $76 \pm 108$  MPs/m<sup>2</sup>) and beach sediment ( $13418 \pm 28787$  MPs/m<sup>2</sup>), with a skip of two orders of magnitude. Microplastic abundances fit with those reported for more anthropized Mediterranean areas and suggest coastal environments as potential debris sinking areas. Fibers dominate all the studied habitats. Holothurians showed the highest general MPs and fibers ingestion occurrence (91%), with greater values ( $9.48 \pm 8.05$  MPs/individual and  $8.24 \pm 7.95$  fibers/individual) than those reported previously (Bulleri et al., 2021). Considering ecological key role, species distribution, and MPs ingestion values, we suggest Holothuroidea as suitable bioindicators for plastic pollution, particularly for fibers. Fibers are composed primarily of cellulose acetate (29%), whereas styrofoam of polystyrene (64%), and films, fragments, and filaments of a variable percentage of polyethylene and polypropylene. Differences found in the polymer composition amongst plastics' morphologies are reflected in the variability observed between habitats and marine organisms. Particularly the polymer composition of fibers coincides with that of one of the MPs ingested by invertebrates. Results suggest that shape is a key plastic characteristic in determining polymer distribution patterns along with habitats and in marine species. Finally, this study highlights once again the importance and urgency of local and global actions needed to mitigate plastic pollution and particularly fiber release into the marine environment.

**Key words:** microplastics, microplastics ingestion, marine protected areas, plastic pollution

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