Microplastics spatiotemporal distribution and variability in marine habitats along the North-Western Mediterranean coastal waters.

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Abstract

The hazard microplastics (< 5mm) represent to the marine environment, particularly in the Mediterranean, generates many impacts on these habitats, from the sediment to the surface, including ingestion by biota. Therefore, a holistic approach is required to properly evaluate our sea's health and the repercussion microplastics have across marine ecosystems, rather than assessing microplastic pollution independently by habitat. Given the lack of research considering this global vision, in addition to the intense anthropic pressures exerted along mediterranean coastal areas, it is urgent to understand the plastic cycle. Thus, in this research, the spatiotemporal variation of microplastics at micro-, meso- and macroscale along the sea surface waters, sediments and biota have been assessed across the North-Western Mediterranean coast through samples from 2017 to 2023. The innovative methodology developed responds to the variability in microplastic distribution due to factors such as sampling effort and techniques, as well as each region's oceanographical patterns. Consequently, the use of quartiles on microplastic's abundance, associated to multivariate analysis, and the ecological quality index promoted by the Barcelona Convention, were evaluated to offer a standardized and integrated measure of microplastic abundance (including fibres) that allows for a general comparison among different areas and habitats, while keeping each region's spatiotemporal variability. Preliminary results suggest the North-Western mediterranean surface waters display a generally constant "bad" and "poor" environmental status, rather than permanent, localized plastic hotspots. All in all, this study offers a new methodology for assessing microplastics' spatiotemporal distribution, particularly useful in characterizing the plastic cycle.

Keywords: Microplastics, fibres, spatiotemporal distribution, Mediterranean Sea, marine compartments.

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