
Filling a critical data gap in nearshore microplastic loads and properties: results from the Surfing for Science project

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Abstract

Only few studies have investigated microplastic pollution at a few meters from shore, mainly due to methodological limitations such as limited access to bathing areas with motorized vessels. Land-sourced plastics first encounter the nearshore, where they effectively breakdown into smaller pieces such as microplastics (< 5 mm) and can pose higher impacts on biodiversity than offshore areas. Furthermore, there is a pressing need to provide fine spatiotemporal data on microplastics in the nearshore to better understand the fluxes and sinks of microplastics at a global scale.

Between October and May 2020 the Surfing for Science project enrolled citizen scientists to collect floating microplastics in nearshore waters of the Catalan Coast (NW Mediterranean Sea) at a weekly/bi-weekly frequency. Our findings show considerable microplastic pollution in nearshore waters (mean value of 0.41 items m⁻²) with a higher frequency of peak concentrations –i.e. hotspots– than in other coastal and offshore areas, and high spatial and temporal variability likely associated to wind and wave intensity and direction. Concentrations peaked in bathing areas adjacent to Barcelona with over 45 items m⁻², which is among the highest concentrations found in the Mediterranean Sea. We found that microplastics –mainly polyethylene (70%), polypropylene (13%) and polystyrene (12%), and of transparent/translucent color (65%)– concentrate in the nearshore, either because of effective breakdown, coastal rugosity (and presence of breakwaters or harbours) or seasonal changes in hydrodynamic conditions. We compare the size distributions of plastics with other studies and find that the nearshore highly contribute to the oceanic microplastic stocks. Further research and monitoring efforts are needed in the nearshore in order to fully understand microplastic behavior under different boundary conditions and assess their impacts on nearshore habitats.

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