

Historical Deposition and Distribution of Microplastics in Marine Sediments at the Mouth of the Kocasu River, Southern Marmara Sea, Türkiye

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Plastic pollution currently poses a significant threat to marine ecosystems, with microplastics disrupting biogeochemical cycles by impacting aquatic environments. In this study, microplastic pollution was investigated in core sediment collected from the mouth of the Kocasu River at a depth of -32 meters, in the southern Marmara Sea.

Radiocarbon dating, grain size analysis, total organic carbon (TOC) measurements, and microscopic examinations were conducted. Microplastics were classified according to their color, shape, and size. Under a stereomicroscope, microplastic abundance ranged from 800 to 6,600 items per kilogram, while fluorescent microscopy revealed a range of 400 to 17,800 items per kilogram. The average microplastic abundance was 5,400 items per kilogram, with a marked decline in microplastic content occurring below a core depth of approximately 45 cm, dated to 484 ± 21 BP. The majority of microplastics were concentrated in the upper 0–45 cm of the sediment core. Microplastics within the size range of 200–50 μ m were predominant, with black being the most frequently observed color. Fragments constituted the dominant shape category, accounting for 69% of the total microplastics identified. Radiocarbon dating further indicated a significant decrease in microplastic abundance below approximately 75 cm, dated to 1422 ± 21 BP.

The spatial distribution of microplastics showed higher concentrations near river mouths, where younger deposits were located. This indicates that land-based pollution is responsible for microplastic accumulation on the seabed. This study provides the first data on microplastic pollution in the region, highlighting the role of the Kocasu River as a carrier of microplastics. The findings are important for understanding the impacts on marine ecosystems and for developing environmental management strategies. This study funded by İstanbul University with project number FBA-2023-40344.