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ABSTRACT

Horizontal and vertical distribution of microplastics in coastal and shelf waters from Yellow Sea of Korea

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Nationwide monitoring study has been done in coastal and shelf waters of South Korea including the Yellow Sea. Horizontal and vertical distribution and pollution characteristics were investigated. To overcome discrepancy in between laboratory bioassay and monitoring data, microplastics down to 20 μm was analyzed. Surface and sub-surface seawater from ten major semi-enclosed bays and coastal areas and continental shelf waters of Korea was in July and August 2014-2017. Seawater samples were collected by Manta trawl net (300 μm) and (or) portable hand-net (20 μm). Natural organic matter in the volume reduced samples were removed by chemical digestion and microplastics were separated using lithium metatungstate solution. Plastic like particles on the filter paper were identified with a μFT-IR microscope. Microplastic abundances in coastal areas were correlated with the surrounding population. Urbanized coasts showed significantly higher abundance than rural and preserved coastal areas. In shelf waters, the Yellow Sea showed relatively high abundance than the southern part of Korea. Even though lower abundance than surface water was found, sub-surface contained considerable amount of microplastics, in which a number of marine organism dwells. The observed sub-surface microplastic abundance were higher than the values predicted by a physical mixing model. In addition, light density polymer such as polyethylene and polypropylene were prevailing through surface to bottom water. Microplastics found in various taxa of zooplanktons and marine aggregates indicates that biological interaction has a crucial role to move surface microplastics to sub-surface.

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