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Pollution by Microplastics in Coastal Areas around Kyushu Region

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Summary

Recently, effects by microplastic (MP) in marine ecosystem have been drawing increasing attention in the world. In marine beaches, due to abundant UV and high temperatures, plastic is easily degraded and due to contact with sand by sea wave and wind, plastic is easily abraded. Therefore, it is considered that beaches are the most MP productive area. However, there are few studies of MP in beaches around Japan. In addition, the mechanism of MP production and accumulation in beach geography and the sand character is still unknown. This study investigated MP pollution and its effects in coastal area around Kyushu. We also assessed whether sand character affects MP production. Finally, dissociation of heavy metals adsorbed on MP is evaluated by chemical analysis.

In March 2021, beaches (six locations) around Yatsushiro Sea were investigated to understand MP pollution in the coastal areas of Japan. In general, concentration of smaller MP in beach sand was higher than the lager MP and a significant region-specific difference was observed. Concentrations of MP were not significantly associated with plastic debris concentration, sand size, and beach gradient.

Results of shaking experiment on polyethylene (PE) and polypropylene (PP) balls with standard sand showed significant increase of weight for PP balls against expectations. This indicates that surface of plastic was abraded and then smaller sand particles produced by abrasion might have penetrated parts of plastic.

To evaluate the MP function as a pollution source and vector of heavy metals, PP and PE were shaken in heavy metal solution and the adsorbed metals in plastic surface were extracted by nitric acid. However, significant dissociation of heavy metals was not detected from both PP and PE, suggesting that heavy metals are not absorbed in plastic or not released from plastic.