

A comparison between the 1D diffusion coefficient of beached litters in the cross-shore direction and surf zone diffusivity off Wadahama beach, Nii-jima Island, Japan

*Yasuyuki Miyao¹, Hirofumi Hinata¹, Tomoya Kataoka², Ryota Sodani¹, Kazuki Ohno¹, Keita Mori¹

1. Ehime University, 2. Tokyo University of Science

Recently, marine litter is widely recognized as a global environmental problem. In addition to large marine debris, small plastic fragments are significant concern because they can be found anywhere in the ocean, coastal regions, and beaches. It is well known that marine debris gradually degrade into small plastic fragments on a beach because of exposure to ultraviolet radiation, heat of the sand, and mechanical erosion. Since long-term stranding on the beach enable marine debris to degrade into small plastic fragments, an understanding of the residence time of litters on a beach can widely applied to preventing the fragmentation of litters and mitigation of plastic pollution on the beach. In the previous studies by Kataoka et al. (2013), it is clarified that reduction of litter population on the beach can be approximated as an exponential function, because the backwash process obeys a diffusion process. The diffusion coefficient can be obtained by measuring their residence time on the beach. To estimate their residence time, Mark-recapture experiments (MREs) are often conducted. However, it is too hard to conduct these experiments on beaches in all part of the world because they consume enormous time and labor. Thus, the previous study proposed that the diffusion coefficient of marine debris is associated with that in the surf zone during storm events. These coefficients are connected with a constant determined by comparing two coefficients. In the present study, to estimate the constant, we conducted the MRE for diffusion coefficient of marine debris on Wadahama beach, Nii-jima Island and a Neutral Particle Experiment using video imaged of the surf zone. We will present these experiment results and relationship between two diffusion coefficients in detail.

Keywords: Beached marine debris, Diffusion coefficient, Mark-recapture experiment, Neutral particle experiment