

Evaluation of heavy metal contamination in the surface sediment of the East Sea-Byeong ocean dumping site using the calculation of the regional background level

HAESAN GU^{1,2}, KI YOUNG CHOI^{1,2}, JUNMO JUNG¹,
CHANGJOON KIM¹ AND CHANG-SOO CHUNG^{1,2}

¹Korea Institute of Ocean Science & Technology

²University of Science & Technology (UST)

Presenting Author: lanstory96@kiost.ac.kr

This study aimed to evaluate the contamination levels of heavy metals of As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn in the surface sediments of the East Sea-Byeong ocean dumping site in Korea, by determining the background levels. Sediment samples were collected during three periods, including the ocean dumping period in 2009, just before (2015), and after (2022) the ban on dumping.

To determine the background concentrations of As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn, linear regression analysis, average concentration, and cumulative frequency curve techniques were used in non-contaminated sediment from the core bottom. The calculated background levels for As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn were 11.3, 0.39, 75.9, 31.2, 0.033, 45.7, 25.1, and 117.0 mg/kg, respectively.

According to the results of the Igeo-accumulation index (Igeo), the contamination decreased as the amount of ocean dumping waste decreased. However, the pollution load index (PLI) results indicated that all values in 2022 exceeded 1 (contamination exists). The potential ecological risk index (RI) indicated that Hg and Cd were the major contributors to heavy metal contamination in the study area. Some stations have maintained a very high ecological risk (≥ 600) from 2009 to 2022, suggesting that heavy metal contamination in the study area persists due to past ocean dumping activities, and continuous monitoring is needed to observe recovery trends.