**Influence of Distribution Coefficients on the Transport of Radioactive Materials in the East Sea**

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In the marine environment, radioactive substances exist not only in dissolved form but also adsorbed onto suspended particles or sediments. The extent of this adsorption, represented by the distribution coefficient (Kd), influences the transport, sedimentation, and long-term behavior of radionuclides in the ocean. This study investigates the role of Kd in modeling the fate and movement of ¹³⁷Cs and ⁹⁰Sr in the ocean. The POSEIDON-R enhanced with an extended BURN food-chain module, was used to simulate the uptake of radionuclides by both pelagic and benthic marine organisms. Region-specific environmental parameters— suspended sediment flux and concentration, bioturbation, and sediment porosity—were estimated, and a wet deposition based atmospheric deposition dataset was incorporated. Kd values were derived from field surveys conducted in both the shallow coastal area and adjacent deep waters of the southwestern East Sea. The study examined how variations in Kd affect radionuclide retention, bioavailability, and vertical redistribution, as well as the behavior of radionuclides in the marine environment and their potential impacts on marine ecosystems, depending on both the radionuclide and regional characteristics. Model experiments incorporating region-specific Kd contribute to enhancing the accuracy of numerical models simulating radionuclide behavior.