Pathways and Distribution Characteristics of Radioactive Material Dumped in the East/Japan Sea

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Long-term behavior of radioactive material dumped in the northern East/Japan Sea was analyzed using Lagrangian particle tracking over 30 years. The analysis focused on the pathways and distribution characteristics of the radioactive material in the surface and subsurface layers. The locations and amounts of the most significant dumping event in the northern Japan Basin in 1986 were used as initial conditions. Multi-decadal simulations were performed over the entire East/Japan Sea using ocean model data with vertical velocity, which reproduced intermediate water critical for the sinking of radioactive material by strong winds. The results showed that particles released from the surface dispersed across the entire East/Japan Sea within 2 years, with concentrations in the south decreasing after 3 years. Subsurface material was transported to the southwest East/Japan Sea via vertical diffusion and intermediate water circulation. Long-term concentrations decreased due to decay and broad diffusion, comparable to the observed variability. This research provides a new perspective on East/Japan Sea circulation characteristics by utilizing long-term radionuclide tracking based on a dumping event.