

Transport processes in the Japan Sea investigated with particle tracking simulations

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Understanding material transport in the ocean is important for understanding the distribution of marine debris such as microplastics and the formation of marine environments. In order to investigate transport processes in the Japan Sea, particle tracking simulations were conducted using the Regional Oceanic Modeling System with a Lagrangian particle tracking model. Particles were released from the Tsushima Strait in four seasons (winter, spring, summer and fall). Two particle situations were simulated: (1) surface drifter particle moving only the surface layer and (2) 3-D particles moving with 3-D velocities. Modeled results were validated with publicly available surface drifter data (GDP). Some fraction of released particles reaches the Tsugaru Strait and are transported toward the Pacific Ocean with a time-scale of approximately 100 days. Results from surface drifter and 3-D particles show different transport patterns in the Japan Sea. Surface drifters are mainly transported toward on the east side of the Japan Sea. On the other hand, 3-D particles distribute the whole area of the Japan Sea. [EM1] The higher dispersion of 3-D particle is caused by submesoscale eddies accompanied by intensified vertical motions. Particles released in winter and fall tend to distribute over a wide area, while those released in spring and summer were distributed along the coast. Vertical advection and eddies contribute to the diffusion and transport of particles in the winter season.

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