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3D hotspots of marine litter in the Mediterranean: a modeling study

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The 3D dispersion of marine litter (ML) over the Mediterranean basin has been simulated using the current fields from a very high resolution regional circulation model (RCM) as a base to run a 3D lagrangian model. Three simulations have been carried out to mimic the evolution of ML with density lower, in the range of, or higher than seawater. In all cases a realistic distribution of ML sources has been used. Our results show that the accumulation/dispersion areas of the floating and buoyancy neutral particles are practically the same, although in the latter the particles are distributed in the water column with 90% of the particles inside the photic layer. Regarding to the denser particles, they rapidly sink and reach the seafloor close to their origin. The analysis of the temporal variability of the ML concentration shows that the regions of higher variability mostly coincide with the accumulation regions. Seasonal variability occurs at a sub-basin scale as a result of the particles redistribution induced by the seasonal variability of the current field. The comparison with previous studies suggests that the accuracy of numerical studies is strongly dependent on the quality of the information about ML sources, and to the modelling strategy adopted. Finally, our results can be used to guide the design of effective observational sampling strategies to estimate the actual ML concentrations in the Mediterranean.

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