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## Sinking microplastics in the water column: simulations in the Mediterranean Sea

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We study the vertical dispersion and distribution of negatively buoyant rigid microplastics within a realistic circulation model of the Mediterranean sea. We first propose an equation describing their idealized dynamics. In that framework, we evaluate the importance of some relevant physical effects: inertia, Coriolis force, small-scale turbulence and variable seawater density, and bound the relative error of simplifying the dynamics to a constant sinking velocity added to a large-scale velocity field. We then calculate the amount and vertical distribution of microplastic particles on the water column of the open ocean if their release from the sea surface is continuous at rates compatible with observations in the Mediterranean. The vertical distribution is found to be almost uniform with depth for the majority of our parameter range. Transient distributions from flash releases reveal a non-Gaussian character of the dispersion and various diffusion laws, both normal and anomalous. The origin of these behaviors is explored in terms of horizontal and vertical flow organization.