

Reviewer report on “Sinking microplastics in the water column: simulations in the Mediterranean Sea” by Fuente et al. (2020)

General comments

This manuscript addresses the transport of negatively buoyant microplastic (spherical) particles in the Mediterranean Sea. The authors have systematically studied the effects of seawater density, unsteady particle acceleration, earth’s Coriolis force, and subgrid scale ambient fluid motions on the horizontal and vertical dispersion of particles. A major conclusion is that the particle velocity can simply be taken as the vector sum of the fluid velocity plus a constant settling velocity when basin scale numerical simulations are performed. The authors have also shown that their results are not basin-dependent and should be applicable to other parts of the world.

I found the manuscript to be well-researched and well-versed. The topic is highly relevant to sustainability and ocean cleanup efforts and therefore the manuscript fits well into the scope of Ocean Science. I did not find any major weaknesses or flaws in the methodology and conclusions drawn in the manuscript. The systematic exploration of the roles of various parameters in affecting particle dynamics on the basin-scale is logical and clear. My recommendation to the editor is accept with minor revision. Below, I provide some suggestions that the authors may consider during their revision.

Specific comments

1. I understand the reasons why spherical particles are chosen for analysis in this study. However, rod-like, or other elongated shapes are common in practice. I wonder how the authors’ conclusions will change with these particles. I am not looking for a complete analysis but an order-of-magnitude argument. Usually, the Stokes relaxation time is modified to account for the different (as compared to spheres) settling velocity of non-spherical particles. This could be a starting point for the authors to consider.
2. The yellow data lines appearing in figures A3, A4 and B1 should be changed to a different color for better presentation.