

Abstract Submitted
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Sedimentation of porous and solid particles in stratified fluids¹

SHILPA KHATRI, CAROL ARNOSTI, ROBERTO CAMASSA, CLAUDIA FALCON, XIE HE, RICHARD MCLAUGHLIN, JENNIFER PRAIRIE, BRIAN WHITE, SUNGDUK YU, KAI ZIERVOGEL, University of North Carolina at Chapel Hill, Mathematics and Marine Sciences — Marine aggregates, particles composed of organic and inorganic material in the ocean, are fundamental to marine carbon cycling both in their importance to bacterial remineralization and carbon flux from the surface ocean. Understanding the function of marine aggregates in carbon biogeochemistry requires knowledge of their small scale settling dynamics in different physical environments. We have conducted experiments to study the settling behavior of single solid and porous spheres and natural marine aggregates through sharp vertical density stratification in ambient fluids. Additionally, we have investigated the behavior of particle clouds. In all of these situations, particles demonstrate decreased settling velocity at the density transition which could be brought about by entrainment of less dense fluid from above and/or diffusion-limited retention. By comparing experimental results to models including entrainment and diffusion, we have identified the mechanisms underlying this delayed settling phenomenon. Discussion of the models will be presented.

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