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**Settling of porous particles through a pycnocline** KOLJA KINDLER, MIT, ARZHANG KHALILI, MPI for Marine Microbiology, ROMAN STOCKER, MIT — Downward carbon flux in the Ocean is largely governed by particle settling. Most marine particles are highly porous and settle at low Reynolds numbers. We present results of an experimental investigation of porous spheres settling through a thin density interface at $O(0.1) < Re < O(1)$. We tracked 100–500$\mu$m hydrogel spheres with porosities exceeding 90% and small hyrodynamic permeabilities, for which the exchange of interstitial fluid is driven purely by diffusion. Two limiting scenarios are identified based on the particle's initial excess density $\Delta\rho$ relative to the lower (denser) fluid phase. For large positive $\Delta\rho$ we observe a drag enhancement similar to that reported for non-porous spheres. For small negative $\Delta\rho$ interstitial fluid exchange by diffusion dominates the dynamics at the pycnocline, leading to retention of particles at the pycnocline. These results could contribute to better estimate the vertical carbon flux and explain high particle concentrations frequently observed at pycnoclines.

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