

Abstract Submitted  
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**Biogenic mixing induced by intermediate Reynolds number swimming at pycnoclines**<sup>1</sup> SHIYAN WANG, University of Notre Dame and Purdue University, AREZOO ARDEKANI, Purdue University — Recently, there has been a debate regarding the contribution of marine organisms to ocean mixing. To address this question, we study fully-resolved motion of interacting swimmers in a density stratified fluids using a “squirmer” model to quantify their contribution to mixing. In the aphotic ocean (i.e. regions that are 200 m beneath the sea surface), zooplankton are the most abundant organisms leading to vertical fluid transport. Their body size ranges from millimeter to centimeter, and their Reynolds number is in the range of  $O(1-100)$ . Therefore, it is important to examine the biogenic mixing in this inertial regime. Our numerical results suggest that biogenic mixing increases with inertia, and in local hot spots, the vertical water transport induced by centimeter-sized organisms is comparable to the turbulent mixing. In the presence of background turbulence, the biogenic mixing is determined by the magnitude of dissipation of kinetic energy introduced by the organisms.

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