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Swarm-scale eddies generated by collective swimmers ISABEL A. HOUGHTON, JOHN O. DABIRI, Stanford University — Biologically generated turbulence has been proposed as an important contributor to nutrient transport and ocean mixing. However, the relevance of such turbulence is dependent upon the ability of swimming organisms to generate mixing eddies at scales comparable to the length scales of stratification in the ocean. Despite their small size, marine zooplankton undergo diurnal vertical migration over hundreds of meters and aggregate in dense swarms ranging from 10-50 m in vertical extent, which introduces additional length scales of relevance to their interaction with the surrounding water. Here we show that representative centimeter-scale swimmers (*Artemia salina*) migrating collectively perturb a stable density stratification at scales corresponding to the vertical extent of the laboratory controlled swarm, approaching 50 cm. This observed formation of swarm-scale mixing eddies is the result of coalescence of the flows in the wakes of the individual organisms and occurs even in the presence of strong density stratification. These results illustrate the potential for marine zooplankton to significantly alter the physical and biogeochemical structure of the water column at the scale of the swarm, orders of magnitude larger than the individual swimmers.

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