Microscale distribution of zooplankton in relation to turbulent diffusion

Maar, Marie, Torkel Gissel Nielsen, Adolf Stips, André W. Visser

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ABSTRACT: Microscale vertical distribution of proto- and mesozooplankton in relation to turbulent diffusion was investigated using a high-resolution sampler (HSR) during cruises in the Skagerrak, Denmark, and the Northern Aegean, Greece. A strong pycnocline and a deep chlorophyll maximum (DCM) characterized both areas. The phytoplankton biomass in the Skagerrak was much higher and dominated by netplankton compared with the Aegean, where picoplankton dominated. Deployments of the HRS and measurements of microscale turbulence were made simultaneously in the mixed surface layer, the pycnocline, and the DCM and revealed a large range (0.2-250 $cm^2 s^{-1}$) in turbulent diffusion. In general, turbulent diffusion was highest in the surface layer. The variability of the plankton organisms within the 3-m strata sampled by the HRS was quantified by their coefficient of variation (CV = SD/mean) and analyzed with respect to turbulent diffusion. We hypothesized that the variability of the vertical distribution would be independent of turbulence up to a threshold where dispersion overwhelms the swimming ability of the organism and variability decreases. The hypothesis was confirmed by our results; for the weak swimmers, ciliates, *Ceratium* spp., and nauplii, there was a significant decrease in CV with increasing turbulence, whereas the variability of the stronger swimmer represented by copepodites was uncorrelated with turbulent diffusion. This underscores the potential of these organisms in locating and exploiting food patches in the water column.